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New Foundries in New England

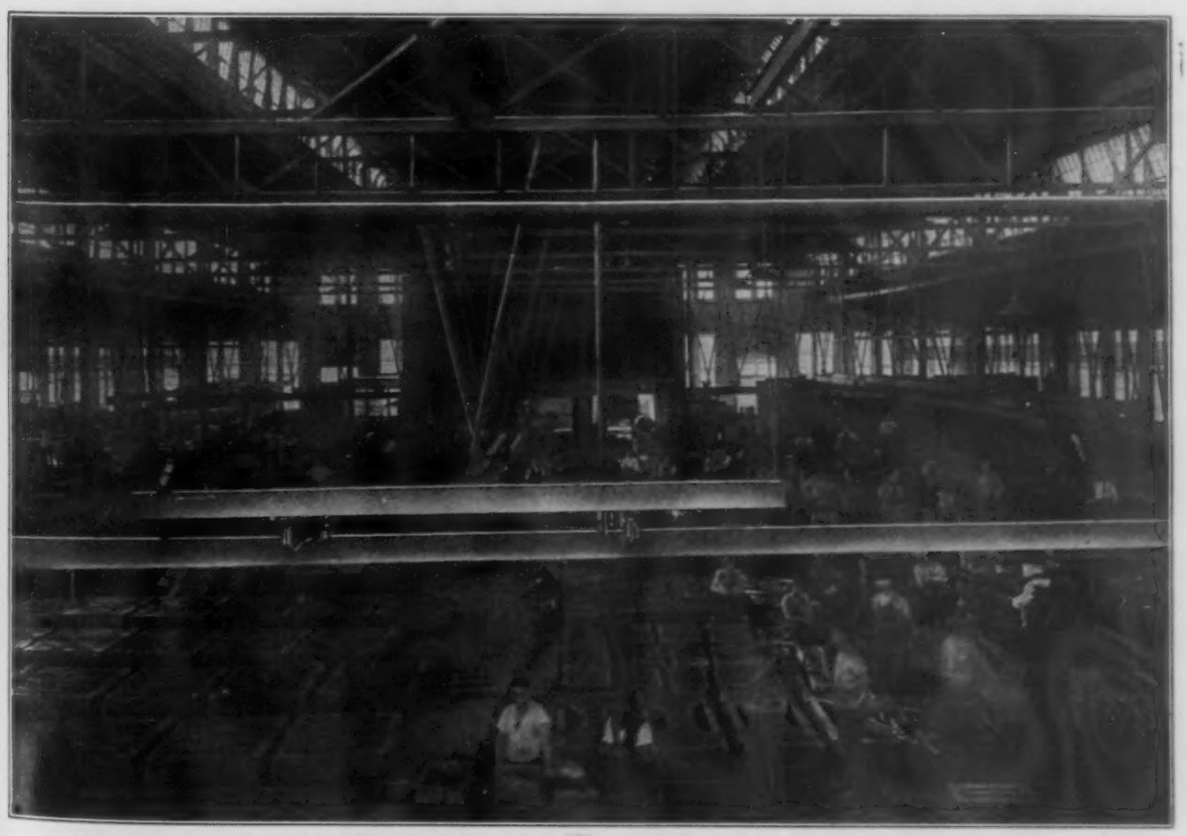
Some of the Plants That Have Been Erected in the Past Year—Pen and Picture Sketch of How They Have Been Planned and Equipped

BY W. E. FREELAND

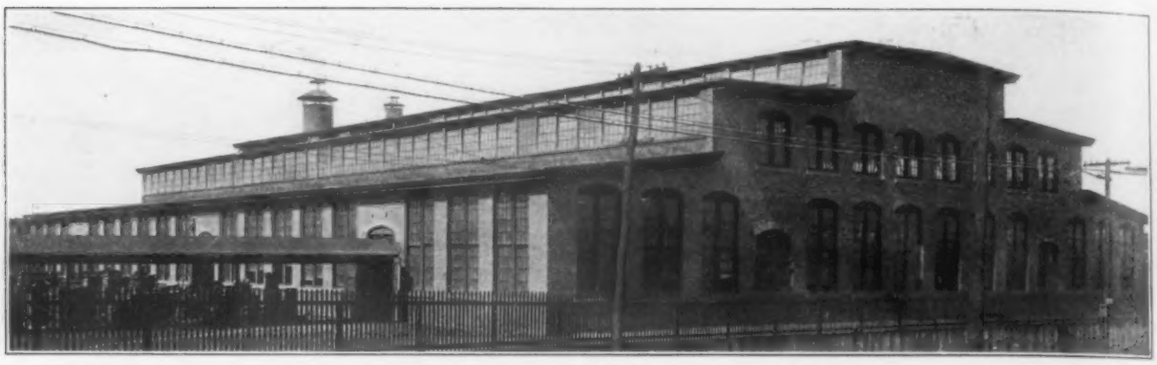
EVEN the most optimistic prophet in 1914 could not have foreseen the wave of foundry expansion that was to take place within three short years. From the doldrums, the manufacture of castings has leaped to an activity unparalleled in the history of the foundry business. This has resulted in new construction everywhere, and New England has not been behind in its proportion of new or greatly enlarged foundries or in the number of new companies that have entered the field. It is not possible to make this review comprehensive; its intent is to show some examples of the results that have sprung from the demand for foundry products.

One of the new plants that the visitors to Boston for the foundry meetings and exhibition next week will have an opportunity to see is that of the Stafford Co., Readville, Mass., a suburb of Boston. The company manufactures weaving machinery, especially automatic looms, and the foundry output is largely of the light, thin castings that enter into loom construction. This makes a special problem of the rapid distribution of metal from the cupola to the various floors and one of the most interesting features of the foundry is the absence of cranes and the extensive use of a monorail system and trolley buggy ladles for filling hand ladles at a number of designated pouring stations at various points on the monorail.

The foundry building is a double monitor type which gives an admirable distribution of light into every part of the building. The two cupolas are situated at one end of the foundry at the end of the central gangway. The larger is a 74 in. and the smaller is a 42 in., both of Paxson make. The



Interior of Stafford Co. foundry—a view that shows the location of cupolas and the routing and suspension of the monorail system that makes possible the pouring of many floors in an unusually short time



The double monitor roof of the Stafford foundry gives well distributed light. The monorail that serves the foundry is extended under a covered passage to the machine shop

practice is to take a heat from the smaller cupola at the end of the forenoon and a heat from the larger cupola at about three o'clock in the afternoon. The day's melt is about 39 tons. Two motor-driven Green pressure blowers are placed on a mezzanine floor above the cupolas and the charging floor above is served by an elevator. A winch, located outside the building, is used to pull out the bottoms.

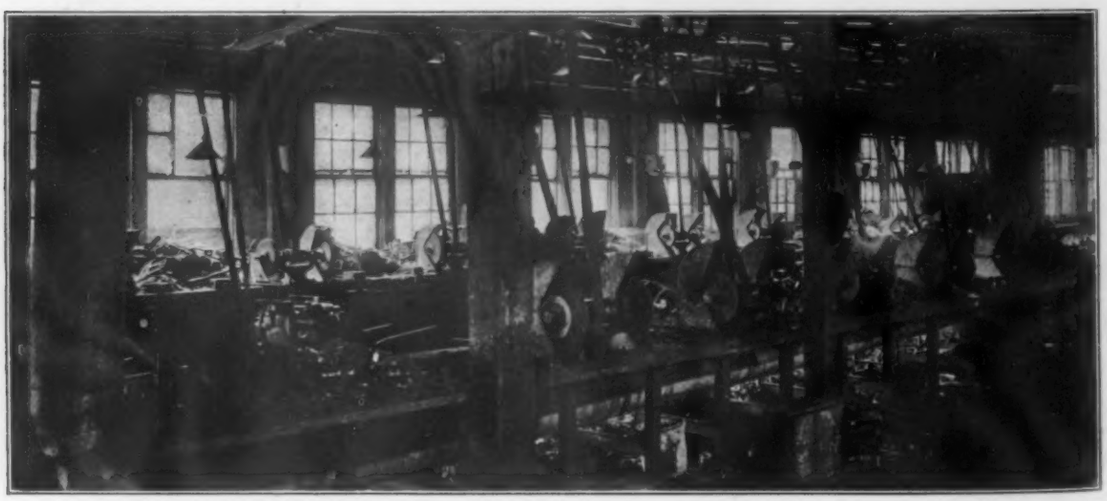
Most of the molding is done on machines, about 50 of the stripping plate type doing the bulk of the work. Two power squeezers, two hand roll-overs, one power roll-over and a few hand squeezers are also a part of the machine equipment. Two special machines for molding worm gears and dobby frames will attract the attention of visitors. In both of these machines, the pattern is pushed up into the sand by the action of gearing under the bed plate. By this method of rotating the worm-gear pattern into and out of the sand a perfect mold is obtained and the output multiplied many times over any other method. A motor-driven reciprocating riddle is used to prepare the sand and a home-made attachment serves to operate the riddle in case of failure of the motor or power.

In the two files are the cards for over 19,000 patterns of the Stafford foundry on which are kept the records of each order

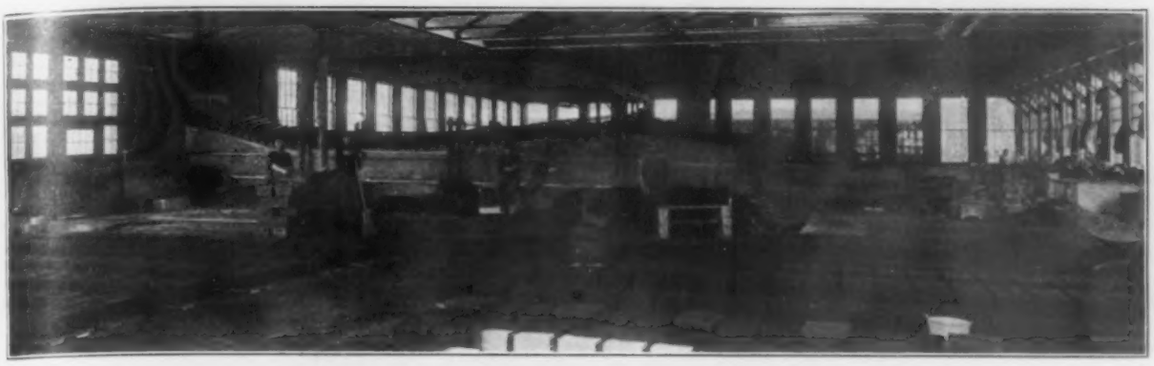
The cleaning room is unusual in its equipment on account of the character of the work. Two large sandstone grinding wheels are used for snagging some of the longer pieces and also the rolls which form a part of the looms. Two floor stands and 17 bench stands are used for general snagging and certain castings are cleaned upon polishing frames. Seven tumbling barrels and two large pickle benches complete the equipment. There are enough large castings to keep a group of chippers constantly employed. A considerable quantity of intricate pasted cores are made and a large number of small round cores are constantly kept in stock.

The demand for malleable castings has kept the air furnace plants of New England working at top capacity for months. The Arcade Malleable Iron Co., Worcester, Mass., is one of the foundries which has been forced to make extensive additions and improvements in order to accept the business booked in the last year. The present management took hold of the business in 1907 and has fostered its growth from a small output in that year to a capacity output of the plant whose importance in its special field is better shown by the illustrations than by any possible grouping of statistics.

The first melt in a new addition—a complete and



A portion of the cleaning room of the Stafford Co. where bench stands are employed to snag the light, thin castings used in looms



This new foundry of the Arcade Malleable Iron Co. was being put into operation as this photograph was made. It will be used eventually for the heavier malleable castings

separate melting and molding department for heavier castings—was made in the early part of this month. The new structure is 75 x 150 ft. The old main foundry is 60 x 400 ft., the annealing room 50 x 200 ft., the cleaning and shipping building 75 x 120 ft. with a second-story section 25 x 120 ft., devoted to a pattern shop and other purposes. A smaller building, until recently occupied as an office, has been remodelled into a pattern storage with a fireproof vault in the basement. The upper part of a two-story building, 52 x 52 ft., has been made into a model foundry office.

A high spur track affords unusual facility for unloading raw materials and supplies into storage piles or into a concrete storage building, the lower portion of which is divided into bins for molding sand, fire brick, clay and fire sand. The upper part has bins for two kinds of core sand and for seacoal. In a small separate building is housed a machine for pulverizing old firebrick into any size of grain desired. The ground firebrick makes a good bottom for air furnaces, and, combined with new clay, makes fine ladle linings and repair material. This machine paid for itself in the first three months of use and is an unusual item of equipment that will interest foundrymen, particularly in these times.

The Arcade general office is in marked contrast with those of many foundries. A series of private offices and consultation rooms open from this general office

The air furnace in the older foundry is of 15 tons capacity; that of the newer foundry, 18 tons capacity. The work is about one-third floor molding and two-thirds bench molding. A few power squeezers are installed. The core room employs about 25 men and the cores are baked in two large, coal-fired ovens. The equipment of the annealing department comprises four large furnaces, of which one of the reproduced photographs gives a good illustration.

A small muffle oven is built at the annealing room end of the air furnace for the gradual cooling of castings whose shape does not permit rapid cooling in the air. A complete pyrometer equipment is installed for the control of the heat of the annealing furnaces, the watchmen having indicator instruments and two continuous-reading instruments in the manager's office. An air hoist on a monorail is used for dumping the annealing pots. A sand blast barrel and ten tumbling barrels do the major part of the work of cleaning the castings.

The company has recently secured a good supply of water by boring an artesian well, equipped with a motor-driven pump. Another new feature is a

One of the bank of four annealing furnaces at the Arcade Malleable Iron Co. Photographed as it was ready for sealing

This grinding machine is used to grind old fire brick to any desired size

modern factory hospital with adequate equipment to take care of all minor injuries.

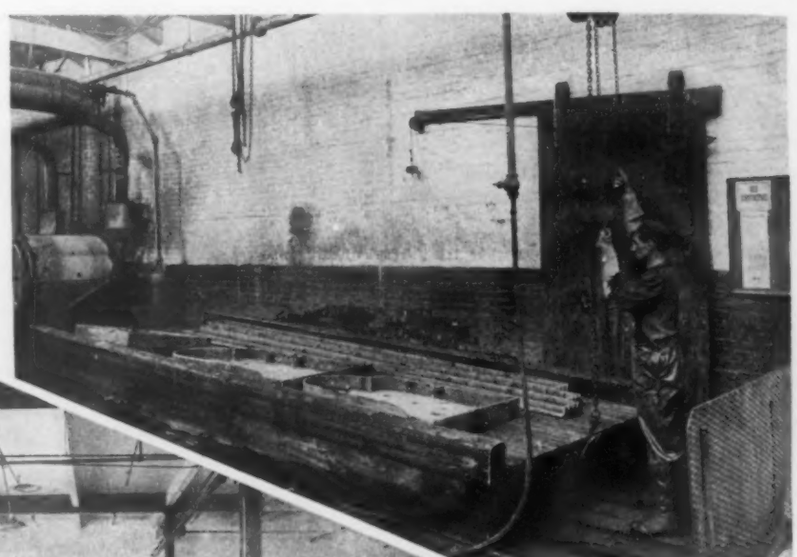
Another interesting Massachusetts foundry is the plant of the Framingham Foundries at South Framingham, Mass. The chief interest in this plant lies in the adaptation of a machine plant to foundry use, involving some difficulties, due to the construction of the buildings, that have been successfully overcome. The No. 1 foundry will have an 84-in. cupola, which at the present time is in the process of erection. The No. 2 foundry has a 76-in. and a 54-in. Paxson cupola. The No. 1 foundry consists of two buildings of the older peak-roof type, one of which will be used for heavy floor work and the other for side-floor work. A 7½-ton motor-driven crane of 64 ft. span will serve the larger building and two cranes with 30-ft. span and 3-ton chain blocks will serve the side floor buildings.

In the No. 2 foundry, which is of typical saw-tooth roof machine shop construction, the service for conveying the metals to various floors is a monorail system with trolley ladles. Some of the machine equipment includes 14 roll-overs, two small plain jolt machines, 15 jolt squeezers, one plain squeezer, two jolt squeezers, split-pattern machines, and 14 "Little Wonder" machines. Extensive use is made of air rammers.

The core room is notable for its fine light and good arrangement. One large oven is constructed with two sets of tracks and trucks so that it serves for both ladle drying and for baking large cores. Six sets of Foundry Equipment Co.'s ovens are used for baking the smaller cores. The coremakers do not have to leave their benches as supplies are brought to them and cores are taken away by other workmen. A group of men is kept solely upon the work of pasting cores and inspecting. The core department also looks after the delivery of cores to the molders.

In the cleaning department is a tilting pickle bench, shown among the illustrations. It is an interesting variant from the general type of such construction. Another interesting apparatus in this department is the grinding fixture shown. This lessens the difficulties that certain awkward pieces present to the snagger. The bank of New Haven sand-blast barrels and a bank of tumbling barrels are employed to clean the smaller castings. Two swing-frame grinders, four floor stands and three sand-blast rooms are in use to take care of the cleaning of larger pieces.

The welding department and a rather large galvanizing department play a part in the finishing of some of the work turned out at this foundry. Having a large air-compressor plant, an extensive use is made of air chisels. This foundry will be found notable among the New England jobbing foundries because of the excellence and completeness of its engineering and chemical control of operations, processes and materials. Four views are here given.



This pickle bench at the Framingham Foundries is tilted to allow the pickling acid to flow off in one direction and the water to flow off in the opposite direction.

The light and pleasant core room at the Framingham Foundries is shown at the left.

About a year ago a new corporation, the Mansfield Foundry Co., took over the old Rider Foundry in Mansfield, Mass., and has made extensive additions. The old foundry was 60 x 90 ft. and a new foundry has been put up 80 x 120 ft. The old foundry has been divided into offices and pattern storage. The new foundry is of the monitor type over a craneway of 29-ft. span, which, while awaiting delivery of an electric crane, is equipped with a hand-operated crane and a 3-ton chain block. Two large jib cranes, located to be of efficient help in handling the heavy flasks and castings on the main floor, and a monorail for conveying the hot metal to different parts of the foundry are other items of handling equipment.

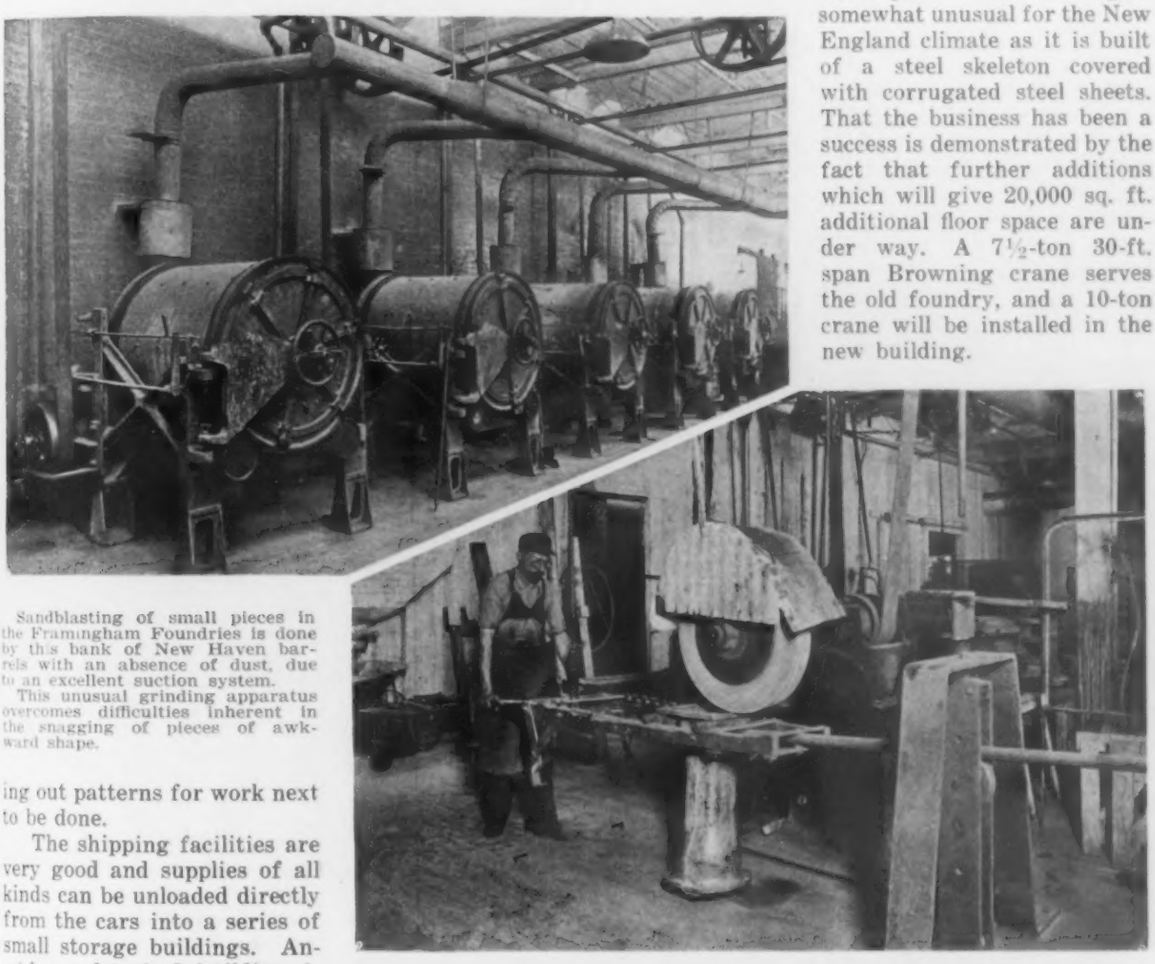
The cupola in the old foundry is a 5-ton and that in the new foundry is a Whiting 8-ton cupola. The blower and its motor are housed in a separate room at the side of the cupola and the charging floor is reached by a ramp on the outside of the building. Construction now projected will replace the ramp by an elevator.

A new oven has been built in the core room, equipped with a truck to take care of the larger cores, and a smaller oven is built into the side of

this for smaller cores. A Millett oven is also in use for baking small cores and a wing of the new foundry, extending over the new core oven, is of sufficient width to provide bins for the storage of core sand. The leakage of heat from the oven helps to keep the sand in good condition.

The usual equipment of grinding machines, tumbling barrels and a pickle bed are found in the cleaning room. Some foundrymen may wonder at the continued use of pickling on a large scale in most of the New England foundries, but those who have tried to do away with pickling find that the demand of the New England customers compels the continued use of this method of cleaning castings.

Patterns are stored in a bay adjoining the old foundry and the room next to this is used for laying out patterns for work next to be done.



Sandblasting of small pieces in the Framingham Foundries is done by this bank of New Haven barrels with an absence of dust, due to an excellent suction system.

This unusual grinding apparatus overcomes difficulties inherent in the snagging of pieces of awkward shape.

The shipping facilities are very good and supplies of all kinds can be unloaded directly from the cars into a series of small storage buildings. Another detached building is used as a shipping department for the entire plant.

A new foundry that has come into the field in Hartford, Conn., in the past year, is that of the Philbrick-Booth Co. This plant is new throughout and has been very successful in the production of the finer grades of machine castings and similar work.

The melting cupola is a 54-in. Whiting with the charging floor in the usual position, served by an elevator. An industrial track with convenient turntables serves all parts of the plant. Over the main molding floor is a 5-ton Whiting crane equipped with a 5-ton Ingersoll-Rand air hoist.

An air compressor plant permits the use of air rammers on the molding floor and air chisels in the cleaning room. A gyratory riddle is used for preparing sand and some of the molds are made on three-power roll-over machines.

A large truck oven in the core room is fired from an outdoor pit. A small oven built into the side of this and a Blodgett oven are used for the smaller work. An interesting feature of this core room shown on page 651 is a home-made crane. The truck wheels of this crane have a ¾-in. oval bearing surface which eliminates much of the friction between truck and track when moving the crane. The lifting apparatus is a 1-ton air hoist. A monorail extends through the cleaning room and far enough outside the building to permit easy loading of castings upon motor trucks. The cleaning room has a complete and adequate equipment of sand blast, pickle bed, floor stands and auxiliary tools and apparatus.

A few months ago the Connecticut Electric Steel Co., Hartford, Conn., began business with a 2-ton Heroult furnace in a plant having 12,000 sq. ft. of floor space. This building is somewhat unusual for the New England climate as it is built of a steel skeleton covered with corrugated steel sheets. That the business has been a success is demonstrated by the fact that further additions which will give 20,000 sq. ft. additional floor space are under way. A 7½-ton 30-ft. span Browning crane serves the old foundry, and a 10-ton crane will be installed in the new building.

A compressor equipment of considerable size permits the use of a 3½-ton air hoist and a liberal number of air rammers and air chisels. Chain hoists are in common use. The core room has a truck oven and a Millett oven for small work, and a large oven is to be built for baking dry-sand molds. The cleaning-room equipment has been carefully selected to take care of the special requirements of a foundry of this type and includes swing-frame grinders, floor stands, tumbling barrels and a Pangborn sand-blast room.

Two home-made oil-fired annealing furnaces that have been in use for some months have been so successful that four more of the same type are to be a part of the expansion which is under way. Fuel-oil torches are used for skin drying and ladle drying. Among the improvements included in the present new construction are a sheet-steel building, 40 x 100 ft., for pattern storage, and the remodeling of a cottage on the property into an office building.

About 1820, Annes Allen Lincoln established in Norton, Mass., the Norton Furnace Co. This is believed by many to have been the first foundry established in New England. In 1853, his son, A. A. Lincoln, Jr., assumed the management and continued to operate it until the plant was destroyed by fire in 1873. He removed the business to Wollaston, Quincy, Mass., where it was incorporated as the Wollaston Foundry Co. Mr. Lincoln continued to be the active manager until his death in 1910, a period of 59 years. Aug. 25, 1916, the plant was again almost totally destroyed by fire. At that time the record melt was 12 tons a day. The plant was at once rebuilt and at the present time is being extended so that the main foundry building will be 300 ft. long. On the anniversary of the fire, Aug. 25, 1917, a new high melt record of 21 tons was reached.

Recently the company has installed a 10-ton electric crane, a duplex air compressor, air vibrators for all molding benches, air rammers, a Blystone core and sand mixer, and has enlarged its power plant. Two jolt machines and 10 power squeezers are in use, most of these being new equipment. New core ovens have been built so that now the plant has two large and two small ovens. An oven is being built for dry sand work. A tramway is used for conveying hot metal and a second crane is to be installed. The present cupola is a 54 in. and it is expected to install another cupola shortly. The company is now doing considerable Government work, particularly for destroyers, submarines and incidental work for the Navy Department.

Two of the most notable among the new plants in New England have been described in detail in previous issues of THE IRON AGE—the Parsons Foundry, Bridgeport, Conn., now a part of the Bilton Machine Tool Co., in the issue of Jan. 4, 1917, and that of the Universal Winding Co., Cranston, R. I., in the issue of June 7, 1917.

New England Foundry Activity in the War Period

Summary of What Some of the 600 Foundries Scattered Over New England Have Been Doing and Expansion Now Going On

SOME conception of the growth of the foundry industry in New England during the war period can be gained from the following brief notes of what some of the more important plants have been doing in that time. Naturally Connecticut, Rhode Island and Massachusetts have led in this growth, not only because the foundry plants are more numerous, but also because the munitions business and its attendant activities have largely centered in these three States.

In Connecticut, Wilcox, Crittenden & Co., Middletown, Conn., operating brass, malleable and gray iron departments, have increased the capacity of their iron foundry by about 30 per cent with corresponding additional equipment of machines and other tools. The company is now building a brass foundry, 40 x 90 ft., which will increase their output of brass castings considerably.

The Birmingham Iron Foundry, Derby, Conn., completed last July a foundry building, 100 x 208 ft., exclusive of core ovens. The new building cuts through the middle of the old foundry by which construction the ends of the old building form two large wings to the main new foundry. In addition there is a large cleaning room and a separate department for light castings. The total floor space devoted to foundry purposes, exclusive of pattern storage buildings, is 50,000 sq. ft. The new foundry is of heavy construction, wholly of steel and glass, and the main crane is of 25 tons capacity and of 62-ft. span. Each side of the main bay is equipped with traveling jib cranes which supplement the main crane above. The side bay, 40 ft. wide, has a 5-ton crane and the opposite side is a long flask runway served by a 7½-ton crane for carrying heavy flasks. Three cupolas are installed and the daily melt is from 40 to 50 tons. New equipment of sand blasts has been installed, air tools of all kinds, and large sand bins with concrete floors have been built. Another new feature is a series of concrete roll pits for casting chilled rolls. The company's own machine department's consumption of castings is about 6000 tons per annum, the remainder of the output going into a large jobbing business in heavy machine castings.

The Eastern Malleable Iron Co., which operates three plants in New England—the Naugatuck Malleable Iron Works, Naugatuck, Conn., Bridgeport Malleable Iron Works, Bridgeport, Conn., and Vulcan Iron Works, New Britain, Conn.—has done little expansion in the way of new construction recently, but has added considerable new equipment wherever it would increase the output or improve the quality of the product. Within the past year it has installed a complete research and analytical department to control and standardize the chemical and physical properties of its malleable products.

The Pequonnock Foundry, Bridgeport, Conn., in the latter part of 1915 added a 75-ft. extension to its main foundry building and in the early part of 1916 installed an additional cupola having a capacity of 9 tons per hour. A number of molding machines and other auxiliary equipment have been installed so that the output in the last two years has been increased 50 per cent. The company has also recently added to its real estate holdings to provide for further additions.

The Manufacturers Iron Foundry, Bridgeport, Conn., has built an addition to its foundry, 50 x 100 ft. in size, and has added to its equipment eight squeezers, two roll-over machines and two traveling cranes. An addition, 40 x 112 ft., has been made to the core room and two core ovens, one, 15 x 25 ft., and another, 15 x 20 ft., have been built. The core room equipment includes three motor-driven riddles and a crane for handling large cores.

In March, 1916, the Bullard Machine Tool Co., Bridgeport, Conn., purchased the small foundry in Fairfield, previously operated by Joseph H. Taylor. A new foundry, 102 x 142 ft., is nearing completion, also another building, 60 x 320 ft., which will be used for a pattern shop, pattern storage and office. The old building, 68 x 135 ft., will be used as a cleaning room and for casting storage. The plant will be devoted solely to making castings for Bullard vertical turret lathes and Bullard Mult-au-matics. The new foundry will probably be in operation by Oct. 1.

The D & W Fuse Co., Providence, R. I., has more than doubled the floor area of its foundry and has installed in the past year two melting furnaces, one for iron and one for brass. At the present time, a further enlargement which will increase the present floor area about two and one-half times with equivalent melting capacity is under consideration.

The Rhode Island Malleable Iron Works, Hillsgrove, R. I., has added approximately 52,000 sq. ft. to core and pattern departments. The annealing capacity has been increased 60 per cent and the melting capacity about 30 per cent.

The Fairmount Foundry, Woonsocket, R. I., is a recent addition to the list of Rhode Island foundries, pouring its first heat Feb. 12 of this year.

The Henry Perkins Co., Bridgewater, Mass., has installed a Byram cupola, with an electric elevator to serve the charging floor, and two jolt-squeeze molding machines. The company has also remodeled its brass foundry.

The Lundin Steel Casting Co., Neponset, Mass., has made no structural additions, but has made a number of additions to and improvements in its equipment. Electric motors have replaced gas engines for power and the grinding equipment and sand blast facilities have been considerably added to; also the compressed air facilities have been extended and increased throughout the plant.

The Gardner General Foundry Co., Gardner, Mass., has made additions to its main plant, increasing it by about one-third in size, and has also purchased the foundry plant formerly operated by the Simplex Time Recorder Co. Both foundries are working at full capacity, principally upon machine tool castings, and the number of employees has grown from 90 to 160.

The Millbury Steel Foundry Co., Millbury, Mass., is installing a 2-ton Heroult furnace which will be the first electric steel equipment in the central part of New England. The company is also making extensive additions which will enable it to double the size of its working force. The extension to the foundry will be 50 x 64 ft., and another addition will be a pattern storage building, 30 x 120 ft. These additions will be of frame construction, as it is the intent of the company to build later an entirely new fireproof plant with all the modern features of construction and equipment special to a steel foundry. The present number of employees is 60.

The General Electric Co. at Lynn, Mass., has remodeled its open hearth plant to accommodate a 5-ton Alliance charging machine now being installed to operate in a 39 by 192 ft. bay. This machine will serve three 20-ton acid furnaces, two of which are operating continuously. A covered storage building for raw materials, 50 x 192 ft., was added to the open-hearth furnace bay and provided with a 10-ton overhead traveling crane. Incoming material is unloaded by means of an electric magnet and in turn loaded into charging boxes, which are carried on all steel roller bearing cars.

At its Everett foundry the General Electric Co. has remodeled the main foundry building, 500 x 120 ft. in size. Side walls of brick and metal sash have replaced galvanized iron, making the building more comfortable for the men. An extension to the main foundry building, 300 x 90 ft., has recently been added. The open hearth department has received a 10-ton overhead traveling crane, which will serve a Brosius charging machine.

New equipment in process of installation includes car type core ovens, four exhaust system sandblasts, a 16 x 24 ft. pit annealing furnace and sand conveyor. A new mill type pattern storage building, 200 x 116 ft. in plan, has just been completed and in this will be located the general stock room, and the first aid emergency room. The molding machines installed include an electric jolt ram machine 72 x 72 in., capable of lifting a mold weighing 40,000 lb.

The Gray Foundry, Poultney, Vt., on Jan. 1, 1917, took over the foundry business of the Ruggles Machine Co. In 1915 the floor space devoted to melting was 2700 sq. ft., the number of employees, 10, and the melt was about 1½ tons four days a week. At the present time the melt is about 6 tons per day and about 40 men are on the pay-roll; 7000 sq. ft. are used for melting and molding and 1200 sq. ft. for shipping and snagging. The actual new construction has added about 2000 sq. ft. of floor space.

In these days of crane scarcity, interest attaches to the home-made crane which serves the core room of the Philbrick-Booth Foundry Co.

The Vermont Snath Co., Springfield, Vt., added materially to its plant in 1914 and is now engaged in making another extension, 140 x 200 ft. This latest addition will be ready for business about the first of next year and will give a total capacity of about 50 tons per day.

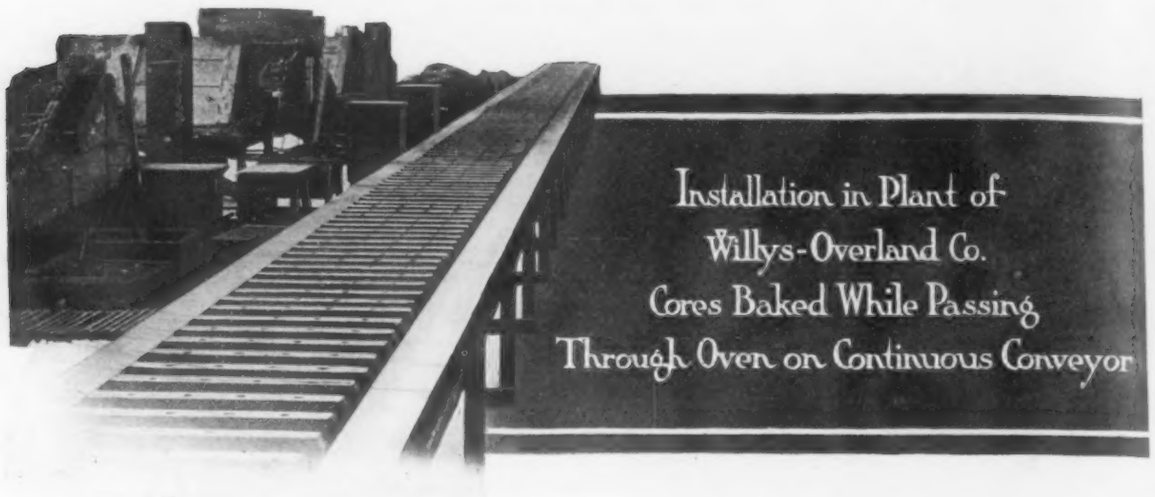
Charles E. Davis, Rutland, Vt., in the fall of 1915 was employing about 6 men in his gray iron foundry and was melting from 2 to 3 tons of iron per day. The number of employees has grown to 100 and the daily melt to an average of 16 tons. Two years ago the only machine equipment was 2 Adams squeezers. The present machine equipment is 11 Adams squeezers, 2 Modern molders and 3 roll-overs.

O. V. Hooker & Son, St. Johnsbury, Vt., has operated a foundry in a small way for some time in the manufacture of its own machinery products and in a general repair business, but since Sept. 1, 1916, has entered largely into the regular jobbing business and since that time the output of the foundry has been increased about 300 per cent. To meet the increasing demand the foundry is now being enlarged and new equipment is being installed.

The Laconia Car Co., Laconia, N. H., enlarged its

(Continued on page 724)

Electric Oven Used for Baking Cores



Installation in Plant of Willys-Overland Co. Cores Baked While Passing Through Oven on Continuous Conveyor

ELECTRICITY for heating a core oven is being successfully used in the first oven of this type that was recently installed in the aluminum and brass foundry of the Willys-Overland Co., Toledo, Ohio. One electrically heated oven has been in use several months, and the erection of a second oven of a similar type, for larger cores, was started recently, but it is not completed at this writing. The two ovens are located side by side under the roof of one of the core rooms in which ovens of the standard type are used. One of the electric ovens is 20 ft. above this core-room floor and the other is 5 ft. higher.

The ovens are of the continuous-conveyor type, and each has a vertical leg of the same section, 20 ft. long, at the front of the oven, extending to the floor, in which doors are provided for loading and unloading the cores. The oven in use is 45 ft. long, and the new one is 60 ft. long. They are 10 ft. 8 in. in height and 5 ft. 6 in. wide, being built in two sections, with a 2-in. asbestos partition between the upper and lower sections. The framework is of steel, and the first oven has asbestos walls 2 in. in thickness on the four sides. The second oven is covered on the four sides with Nonpareil insulating brick. The ovens are supported by steel trusses on which is laid a floor or platform of steel plates. Other steel trusses carry the conveyor machinery in the ovens, so that the supports of the ovens and their conveyors are entirely independent.

Cores baked in the continuous electric ovens are made on a second-floor core room, at one end of which, at a convenient height above the floor for loading, are the oven doors. Beneath the core room is a sand storage room, from which core sand is carried up in a bucket elevator. A roller chain conveyor, 100 ft. long and 24 in. wide, extends the length of the second-story core room through the center, terminating near the entrance to the oven. This is shown in one of the illustrations. The core-room makers' benches are located on both sides of the conveyor, and when they finish their cores they put them on plates or trays which are placed on the conveyor and thence are carried to the oven. The trays are flat sections of cast iron, 14 in. wide and 30 in. long, and having numerous circular perforations to allow the free circulation of the hot oven atmosphere. Usually, two or three cores are placed on one tray, the number depending on the size. The cores remain on the trays until removal from the oven.

The movement of the core-room conveyor, which is not in continuous operation, is controlled by a push-button by an operator who stands at the end of the conveyor. This operator lifts the tray of cores from the conveyor and places it on a short section of a roller platform built on a slight incline, over which he pushes it into the oven conveyor, the tray fitting into an angle-iron shelf in a carriage or rack in this conveyor. The carriages, which are pivoted to the conveyor on 5-ft. 6-in. centers, have double rows of shelves, each carriage having eight shelves on each side. The conveyor is 126 ft. 6 in. long, and has 23 carriages. The second conveyor, for large cores, has four carriages on 5-ft. centers, but only four shelves on each side. One of these carriages, about to be installed in the new oven, is shown standing on the floor in the illustration of the loading end of the oven.

The travel of the cores, after being placed on the conveyor at the loading door, is upward to the top half of the oven, from the front to the back of the oven, back through the lower section, and down a vertical section of the conveyor to the lower floor, where the baked cores are taken out. Here a short section of roller platform is provided for handling the trays and cores, similar to that at the loading end. The conveyor carriages pass on and up to the loading end of the oven, again to be filled. After the cores are taken from the conveyor trays the latter are placed on a 12-in. belt conveyor with steps bolted to it for carrying the trays to the second-floor core room.

The conveyor travels at a speed of approximately 9 in. per minute, and is driven by a 5-hp. motor. It takes 2 hr. 5 min. for the cores to pass from the loading end to the discharge end of the oven, the conveyor making the complete circuit in 2 hr. 40 min. The time required in the new oven will be slightly longer, owing to its greater strength. Large cores have been baked in the first oven pending the completion of the larger oven, these being allowed to make two circuits through the oven instead of one circuit. The capacity of the oven for small cores is approximately sixteen trays of cores every 7 min. It has proved of sufficient capacity to bake all the cores made by its sixteen core makers, although on the average it will handle

the output of twelve men. With the completion of the new oven all the cores made for the foundry will be baked in the two electric ovens.

The heating units are distributed all through the ovens, in both the lower and upper sections. The cores are dried off in the upper half of the oven, and are baked in the lower half, where the temperature is higher, and cooled off somewhat while passing through the vertical section on their way to the discharge door on the lower floor. A 30-in. stack 20 ft. high, controlled by a damper, is located above the front of each oven to carry away the gases, which travel in a direction opposite to the movement of the conveyor. The conveyors and steel frame supports for the ovens were supplied by the Link-Belt Co., and the ovens were built by the Young Brothers Co.

There are 21 heating units in the oven, of General Electric make, with a rating of about 8.2 kw. each. Nine are controlled by a hand-operated switch, and the remaining twelve are on a circuit controlled automatically by a Brown pyrometer. The heat is thrown on the oven by the watchman at 5.30 a. m., and this allows about two hours for the oven to get up temperature before the core makers start to work.

In the table are given the results of a test of the oven, made recently by a representative of the power company supplying current for the plant.

Supplementing the figures showing the results of the test, the following statement was made:

"The results of this test are indicative of continuous operation since the oven was up to operating temperature when the test was begun.

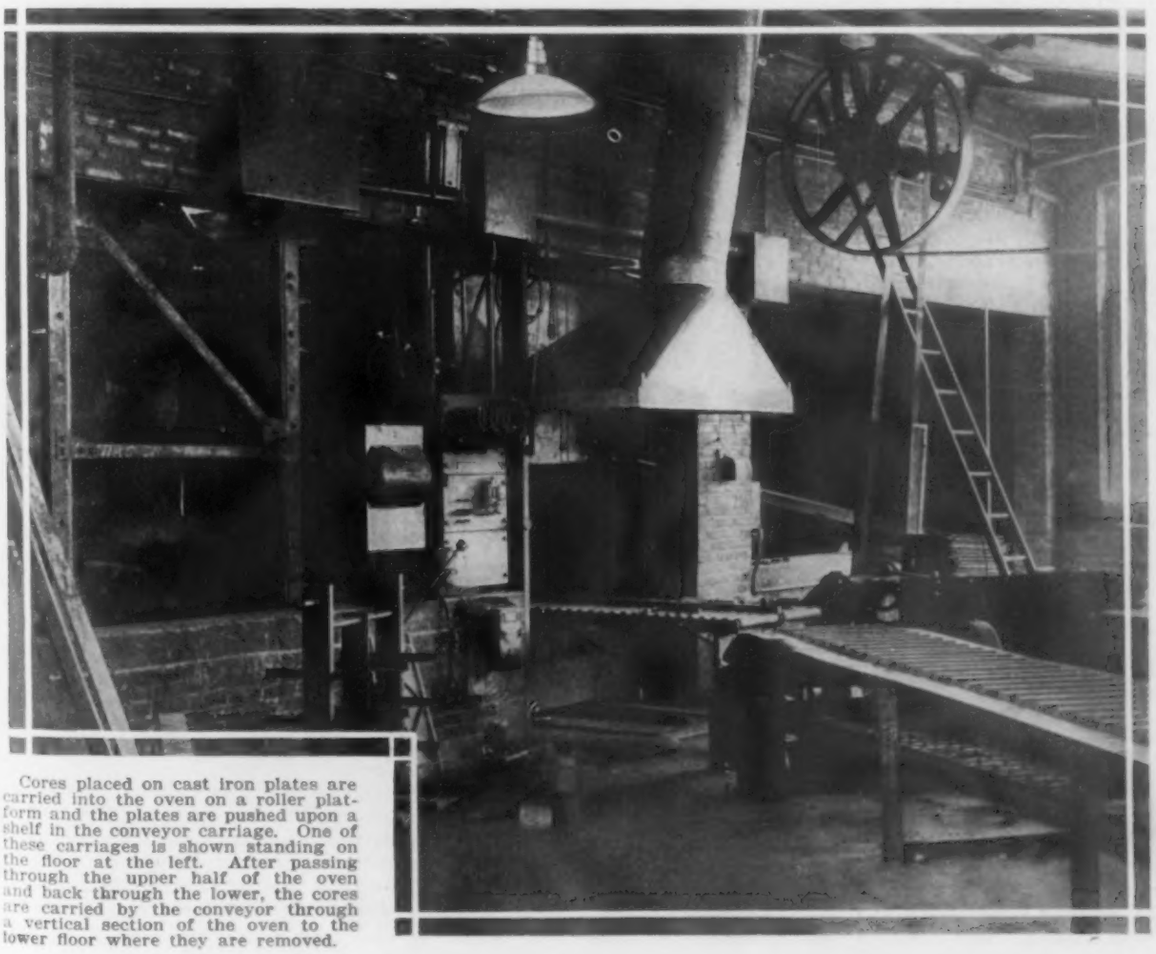
"The heat required for the operation is that to bring the cores up to temperature, to drive off the moisture, to bring the plates up to temperature, to heat the ventilating air and to supply the losses through the walls and through metal. There is also a loss of heat by the larger cores while passing through the vertical leg of the oven, as they are returning to go through the horizontal leg the second time. Since the large cores have to be sent through the oven twice, the production is cut down.

Test of the Electrically Heated Core Oven

Duration of test, min	320
Average temperature of operation, deg. Fahr	386
Cores baked, lb	6 907
Electric power, kw. hr	915
Pounds of cores per kw. hr	7.55
Kw.-hr. per pound of core	0.1324
Moisture in the sand, 6 per cent assumed, lb	415
Heating moisture, 415 × (326 + 966), B.t.u	536,180
Heating sand, (6,907 — 415) × 0.45 × 326, B.t.u	952,376
Total heat to bake neglecting air, B.t.u	1,488,556
Heat input, 3 412 × 915, B.t.u	3,121,980
Thermal efficiency, per cent	47.68
Radiation per hr., 1,009 × 0.25 × 326, B.t.u	82 234
Total radiation during test, B.t.u	438,304
Heat absorbed by plates, B.t.u	221,940
Total heat accounted for, B.t.u	2,148,800
Heat consumed by air and through iron, the amounts of which it was not feasible to ascertain, B.t.u	973,180

"The heat required for absorption of the iron temperature of operation. Results show that there is a loss of 24 kw. per hour with the present 2 in. With 4 in. of insulation this loss would be only one-half as great.

"The heat required for absorption of the iron plates is 41,640 B.t.u. per hour, or 12.2 kw. hr. If these plates were made of aluminum, the same size, the heat required for absorption would be 26,500 B.t.u. per hour, or 7.77 kw. hr."



Cores placed on cast iron plates are carried into the oven on a roller platform and the plates are pushed upon a shelf in the conveyor carriage. One of these carriages is shown standing on the floor at the left. After passing through the upper half of the oven and back through the lower, the cores are carried by the conveyor through a vertical section of the oven to the lower floor where they are removed.

Effect of Embargo is Clearly Shown

Exports of Iron and Steel Products in July Decline Sharply, Being Most Marked in Machine Tools—Increased Imports of Scrap and Billets

WASHINGTON, Sept. 18.—The embargo instituted by the Exports Council, effective July 15, cut heavily into the exportations of iron and steel for the month of July, according to the official statistics of the Bureau of Foreign and Domestic Commerce. As compared with previous high records, the decline was heaviest in machine tools, tonnage iron and steel and machinery in the order named. The fact that the decrease in shipments of tonnage commodities was substantially greater than that in total exports by values is significant of the price trend. The decline in exports of machine tools, being in line with the uniform tendency of the past year, is less notable than the shrinkage in other machinery, which fell off one-third as compared with the preceding month. A feature of the July statistics is the separate enumeration of a number of export items which recently have assumed considerable importance and the subdivision of the classes, including parts of engines and machine tools, with a view to furnishing more detailed information to the trade.

Exports of iron and steel by values during July gained 10 per cent over the corresponding month of 1916, but lost no less than 35 per cent as compared with the high record of June of this year. Tonnage iron and steel recorded a marked decline, losing 30 per cent as compared with July, 1916, and falling 46 per cent short of the record figures for September, 1916. Exports of machinery, which gained notably in the closing months of the last fiscal year, declined 4 per cent as compared with July, 1916, and fell 35 per cent below the high water mark reached in June of this year. Shipments of machine tools, which have been steadily declining since the munition factories of the Allies practically completed their equipment, were 40 per cent less than in July, 1916, and 52 per cent below the maximum recorded in May, 1916.

Exports of Machinery

	July		Seven Months	
	1916	1917	1916	1917
Adding machines	$108,662	$194,860	$827,802	$1,332,671
Air-compressing machinery	87,489	45,331	381,865	591,541
Brewers' machinery	791	11,417	11,282	72,358
Cash registers	74,559	32,090	871,821	586,933
Parts of	22,600	10,572	87,534	51,927
Concrete mixers	.....	a14,365	.....	a14,365
Cotton gins	4,606	11,274	39,344	61,367
Cream separators	26,375	51,100	320,863	428,568
Elevators and elevator machinery	155,527	105,728	948,364	1,317,935
Electric locomotives	13,176	21,961	373,479	293,692
Gas engines, stationary	30,690	65,881	211,946	558,941
Gasoline engines	981,345	1,459,909	9,224,071	13,843,789
Kerosene engines	.....	a208,107	.....	a208,107
Steam engines	1,126,375	2,622,340	5,697,812	15,420,458
All other engines	197,511	117,688	3,109,225	2,842,622
Parts of	875,130	.....	5,075,839	b9,276,925
Boilers	.....	a211,754	.....	a211,754
Boiler tubes	.....	a481,538	.....	a481,538
All other parts of engines	.....	a867,050	.....	a867,050
Excavating machinery	.....	a26,683	.....	a26,683
Milling machinery, flour and grist	152,040	29,971	1,514,683	481,683
Laundry machinery, power	18,714	23,511	170,908	268,084
All other	16,591	10,039	119,657	143,720
Lawn mowers	15,705	22,146	147,307	137,626
Metal-working machinery (including metal-working tools)	7,814,691	.....	47,182,401	b44,604,259
Lathes	.....	a1,559,834	.....	a1,559,834
Other machine tools	.....	a769,435	.....	a769,435
Sharpening and grinding machines	.....	a442,042	.....	a442,042
All other metal-working machinery	.....	a1,929,328	.....	a1,929,328
Meters, gas and water	26,166	53,618	204,992	297,081
Mining machinery, oil well	355,190	86,342	1,122,709	795,847
All other	651,537	616,005	3,519,661	6,359,970
Paper-mill machinery	76,097	187,898	417,471	1,083,432
Printing presses	114,042	74,119	1,052,668	925,439
Pumps and pumping machinery	437,277	454,902	2,995,688	3,513,627
Refrigerating and ice-making machinery	111,445	125,471	419,762	660,625
Road-making machinery	.....	a30,051	.....	a30,051
Sewing machines	398,068	869,683	3,222,701	4,623,733
Shoe machinery	72,680	155,248	583,926	924,007
Sugar-mill machinery	448,428	359,559	1,954,068	3,833,619
Textile machinery	333,511	230,511	1,995,143	1,898,385
Typesetting machines	130,363	58,648	737,902	686,282
Typewriting machines	742,879	705,389	5,899,249	6,179,118
Windmills	78,695	141,097	678,752	637,408
Wood-working machinery, saw mill	30,938	135,180	244,027	349,986
All other	52,002	120,813	483,164	653,563
All other machinery and parts of	3,189,337	2,457,941	21,558,897	24,056,764
Total	$18,971,052	$18,208,429	$123,406,983	$156,334,172

a Not separately enumerated prior to July 1, 1917.
b Six months ending June 30, 1917.

Imports of Iron and Steel

	July		Seven Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Ferromanganese	5,341	2,037	40,162	32,633
Ferrosilicon	487	702	4,042	6,233
All other pig iron	606	2,933	22,975	10,453
Scrap	4,615	13,107	34,289	150,576
Bar iron	987	968	4,289	1,503
Structural iron and steel	7	1,128	1,012	1,681
Steel billets without alloys	145	5,742	8,031	20,029
All other steel billets	1,202	1,232	9,007	4,248
Steel rails	546	579	16,520	4,321
Sheets and plates	192	263	1,094	1,100
Tin and terne plates	150	....	671	115
Wire rods	495	168	2,666	193
Total	14,773	28,859	145,309	233,085

Record Not Surpassed

The record for the seven months ended July 31 remains unbeaten in spite of the general declines throughout the closing month. Total exports by values for the seven months rose 62 per cent over 1916, which in turn surpassed any previous record by more than 150 per cent. Tonnage iron and steel gained 20 per cent over the record total for 1916, machinery showed an increase of 27 per cent over 1916, which exceeded by nearly 100 per cent any previous corresponding period, and machine tools surpassed by 5 per cent the record of 1916, which exceeded by 100 per cent that of any prior seven months.

The value of all shipments of iron and steel products in July, 1917, was $77,782,294, as compared with $70,745,162 for the same month of 1916 and $119,141,830 for June of this year which is now the record total. For the seven months of 1917, the total was $713,426,557 as compared with $442,640,120 for the corresponding period of 1916 and $174,971,176 in 1915. Exports of machinery in July were valued at $18,208,429 as against $18,971,052 for the same month a year ago. For the seven months, the total was $156,334,172 as compared with $123,406,983 for the same period of 1916. The best previous record, that of 1915, was $67,957,315. Shipments of metal-working machinery aggregated $4,700,639 in July as against $7,814,691 in the same month of 1916. For the seven months of 1917, the exports totaled $49,304,898 as compared with $47,182,401 for the corresponding period of 1916. Details of the exports of machinery in July, 1916 and 1917, and for the two seven-months' periods are given in the accompanying table.

Exports of iron and steel for which quantities are given aggregated 349,649 gross tons in July, 1917, as compared with 496,624 tons in the same month of 1916.

Exports of Iron and Steel

	July		Seven Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Pig iron	28,718	.....	178,118	*b*375,687
Ferromanganese	.....	*a*629	.....	*a*629
Ferrosilicon	.....	*a*2,067	.....	*a*2,067
All other pig iron	.....	*a*29,672	.....	*a*29,672
Scrap	4,788	3,196	103,684	127,948
Bar iron	6 934	3,438	47,038	34,156
Wire rods	14,598	8,503	96,133	79,059
Steel bars	78,947,	32,109	445,256	374,391
Billets, ingots and blooms, n.e.s.	129,278	112,085	727,644	1,142,032
Bolts and nuts	2,286	2,833	16,704	17,556
Hoops and bands	3,953	5,092	25,941	31,961
Horseshoes	841	154	5,834	1,619
Cut nails	630	197	2,517	1,936
Wire nails	12,328	7,157	84,532	53,869
Wood screws	.....	*a*451	.....	*a*451
All other nails, including tacks	869	912	4,918	980
Cast-iron pipes and fittings	6,466	7,328	36,025	42,119
Wrought pipes and fittings	14,420	7,132	71,060	74,703
Radiators and cast-iron house heating boilers	193	461	1,198	3 829
Railroad spikes	1,495	1,006	17,195	11,965
Steel rails	21,822	19,704	262,953	315,237
Galvanized iron sheets and plates	7,138	5,157	46,596	50,148
All other iron sheets and plates	2,941	3,964	26,527	33,638
Steel plates	21,778	36,269	145,812	305,691
Steel sheets	7,323	9,931	59,574	82,048
Ship and tank plates, punched and shaped	.....	*a*1,417	.....	*a*1,417
Structural iron and steel	26,583	14,633	154,569	181,888
Tin and terne plates	18,742	16,719	141,599	145,142
Barb wire	47,474	14,544	252,672	104,097
All other wire	36,079	12,889	162,135	116 950
Total	496,624	349,649	3,116,234	3,742,885

a Not separately enumerated prior to July 1, 1917.
b Six months ending June 30, 1917.

The record for exports of these commodities is still held by September, 1916, with a total of 643,763 gross tons. For the seven months ended July, 1917, these shipments aggregated 3,742,885 gross tons as against 3,116,234 tons for the same period of 1916. The accompanying table shows the exports for July and for the seven months ended July, 1917, as compared with 1916.

The imports of iron and steel in July recorded an increase of 100 per cent, due almost wholly to increased receipts of scrap and steel billets. The total imports for July, 1917, were 28,859 gross tons as compared with 14,773 tons in the same month of 1916. For the seven months of 1917, the imports aggregated 233,085 gross tons as against 145,309 tons for 1916. The imports of tonnage commodities for July and for the seven months of 1917 as compared with 1916 are shown in the accompanying table.

British Restrictions on Chrome Ore and Benzol

The British Minister of Munitions forbids purchase or delivery of chrome ore except under permit from the Director of Materials. He has also ordered that from Oct. 1 no person shall supply, accept or attempt to obtain delivery of crude benzol, crude naphtha or light oils containing recoverable quantities of benzol or toluol except under license. Crude benzol and crude naphtha mean such as are obtained by distillation of coal tar or extracted from coal gas. Light oils mean light oils obtained by the distillation of coal tar.

Two New High-Speed Tool Steels

Two patents have been granted recently for new high-speed steels. One is a tungsten-chromium-vanadium type of steel patented (U.S. 1,233,118) by James H. Parker, Reading, Pa., and B. H. De Long, Springmont, Pa., and assigned to the Carpenter Steel Co. of Reading. It is characterized by a high percentage of cobalt as the following analysis shows:

	Per Cent		Per Cent
Carbon	0.35	Tungsten	12.00
Vanadium	2.00	Cobalt	30.00
Chromium	3.50	Iron	52.15

The iron and cobalt proportions correspond with the eutectic relation and it is claimed that maximum service with increase of speed and cutting efficiency is possible.

The other new alloy is covered by a patent (U.S. 1,233,862) granted to Radclyffe Furness of Jenkintown, Pa., and assigned to the Midvale Steel Co. According to the patent, if a certain amount of both cobalt and tungsten is added to an ordinary high-speed tool steel containing tungsten, chromium and vanadium, a substantial increase in cutting efficiency is attained. The following table is given as the preferred analysis, together with the limiting proportions:

	Preferred Analysis, Per Cent	Limiting Proportions, Per Cent
Cobalt	4.5	3.0 to 7.0
Uranium	0.7	0.1 to 2.0
Tungsten	13.5	12.0 to 20.0
Chromium	3.5	2.0 to 6.0
Vanadium	1.5	0.5 to 2.0
Carbon	0.7	0.5 to 0.9

The amount of uranium is so little that it cannot be said to replace the regular high-speed tool steel elements to any extent. Its presence, however, even in almost insignificant proportions is said to improve the efficiency of the tools.

British Iron-Ore Production

The iron-ore output of the United Kingdom in 1916 was officially 13,700,039 gross tons, of which 6,300,000 is estimated as coming from quarries. The corresponding figures for 1915 were 14,235,012 tons, with 6,358,907 tons from quarries. For 1914 the total was 14,867,582 tons, with 5,883,090 tons from quarries and for 1913 it was 15,997,323 tons, with 6,405,851 tons from quarries.

Many plants which have hitherto been engaged in the manufacture of 8 and 9.2 in. shells for the British Government in Canada will be converted into plants suitable for producing 6 in. shells.

Structure of Iron Cast in Metal Molds

A Comparison With That of Iron Cast in Sand Molds—Relative Size of Microconstituents — Chemical Composition of the Two

BY EDWIN F. CONE

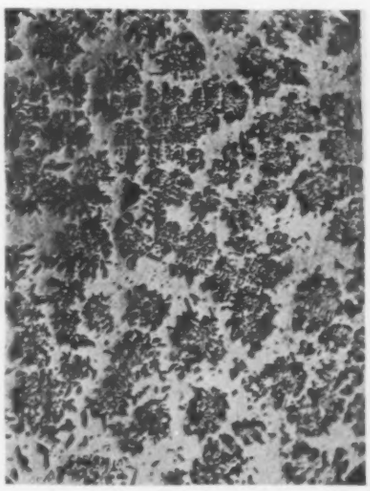
IT is evident that there must be a decided difference between the microstructure of cast iron cast in sand molds and that of the same iron cast in a metal mold, especially a rapidly revolving one. It has been commercially demonstrated that it is possible to make cast-iron pipe in rapidly revolving molds, the metal being deposited by centrifugal action. The pipe so made are of considerably thinner section than the sand cast, but are equally strong or stronger. An investigation of the structure and composition of pipe made by the two processes is the object of this brief study.

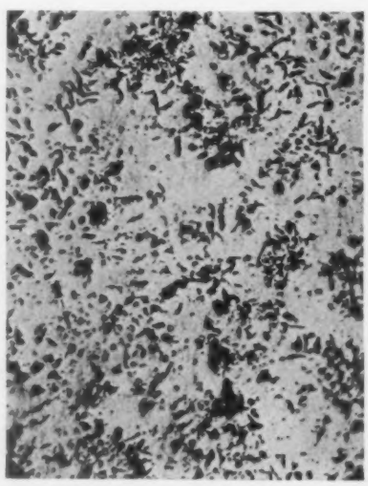
The usual method of making sand-cast pipe is familiar. The metal cools very slowly, affording opportunity for it to crystallize in large form. In metal molds the conditions are different, depending on the time the hot metal remains in contact with the mold. In pouring hot metal into a rapidly revolving metal mold and removing the casting as soon as it has become solid, the crystal formation is proceeding under entirely different conditions. The crystals are not given the time to develop slowly. The question of the extent to which the carbon assumes the combined form is also important.

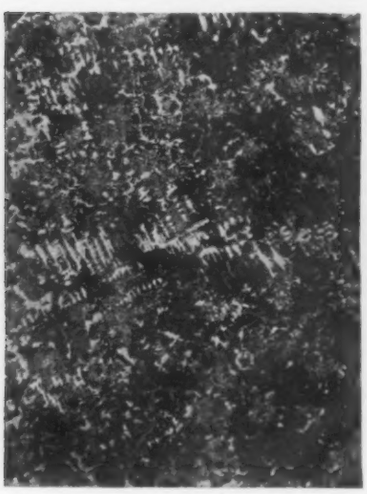
One of the principal constituents of cast iron which affect its structure and strength is carbon. This exists largely in the graphitic state in such pipe. If the graphite is coarse or inclined to be lamellar or platy, the strength of the iron is not so great as when the graphite is in a more finely divided condition. This is one of the points made by J. E. Johnson, Jr., in his claim for the superiority of cast iron or pig iron containing oxygen, the graphite in such iron being in a fine state.

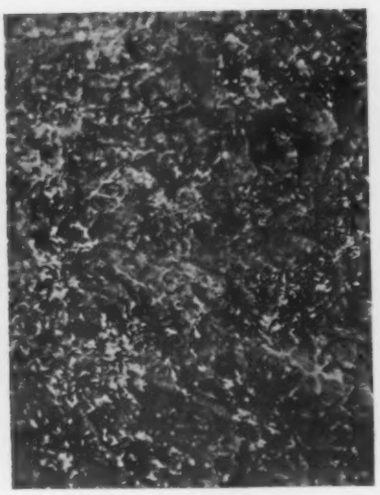
Theoretically the carbon in slowly cooled iron should be found in larger globules or flakes than in iron that cools more quickly. Iron cast in a permanent mold, whether it revolves or not, should contain smaller crystals of carbon or graphite as well as of other constituents. When the iron so cooled is removed into the air, the cooling and formation of the crystals is accelerated. This is demonstrated by a microscopic examination.

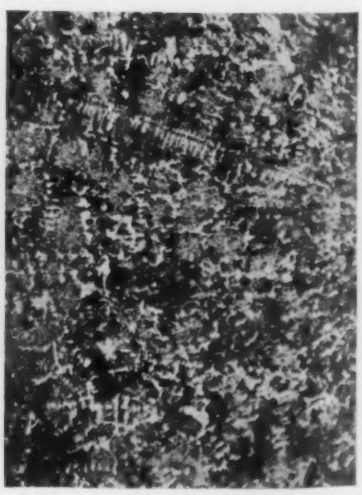
It has been possible for the writer to obtain samples of 4-in. cast-iron pipe made by both processes. The sand-cast pipe had an average thickness of about ½ in. and the centrifugally cast-iron pipe a thickness of 3/16 in. The latter was practically of uniform wall section throughout. A microscopical examination of the sand-cast pipe is shown by Figs.





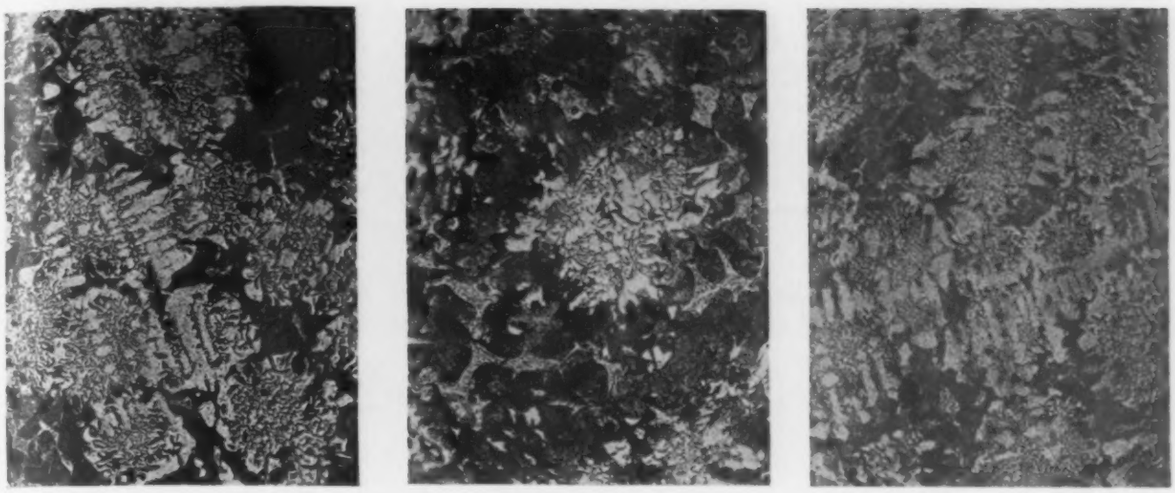






Photomicrographs of cast-iron pipe cast in sand, all reduced about one third from an original diameter of 90. Fig. 1 (upper left) is from the inside wall as polished. It shows graphite in fine clusters. Fig. 2 (upper right) is from the center of the cross-section of the wall of the pipe and shows the graphite as coarser and inclined to be platy.

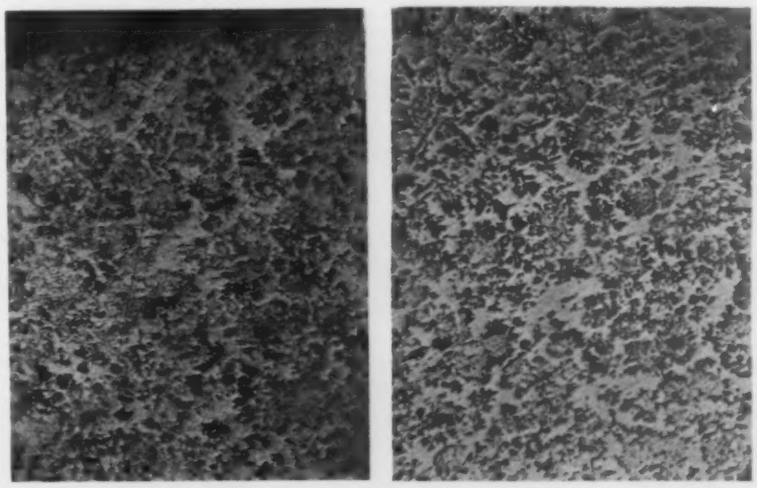
Figs. 3, 4 and 5 (lower row, left to right) are the same metal etched. Figs. 3 and 5, the inside and outside wall surface, show white dentrites which are ferrite (silico-ferrite), the ground mass being pearlite with some carbide eutectic. The center of the metal, Fig. 4, is similar but much coarser, graphite plates being more distinct.



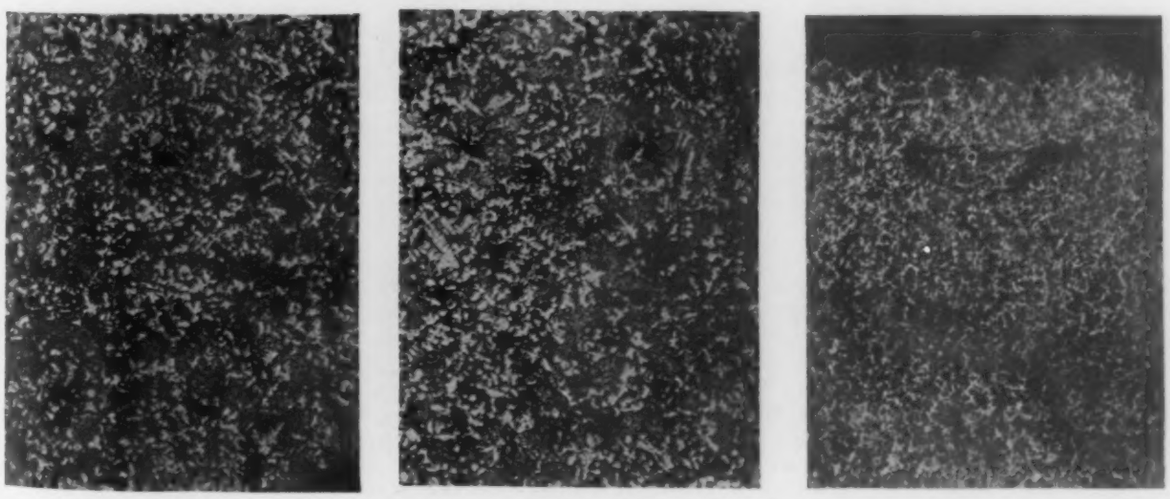
Photomicrographs of cast-iron pipe cast in revolving metal mold, all reduced about one-third from an original diameter of 250. Figs. 6, 7 and 8, left to right, represent the inside, center and outside sections of the cross-section, respectively, similar to Figs. 3, 4 and 5, and are from etched specimens. Figs. 6 and 8 reveal white dentrites, silico-ferrite, surrounded by a mixture of fine graphite and ferrite. The network of pearl te contains cementite eutectic which is phosphoric in places. Fig. 7, the center of the metal, shows a grain of ferrite and graph te surrounded by pearlite in which is graphite as plates, together with cementite-phosphide eutectic.

1 to 8. Figs. 1 and 2 reveal the inside and center of a cross section, the outside surface being the same as the inside. They are unetched. Fig. 1 shows graphite in clusters which are very fine. Fig. 2, the center of the metal, shows a coarser graphite which is inclined to be platy.

The same metal etched is shown by Figs. 3, 4 and 5, inside, center and outside respectively. Fig. 4, the center, is similar to the others, but much coarser. The same metal under a higher magnification is shown by Figs. 6, 7 and 8, outside, center and inside respectively. There is again but little difference between the outside and inside, but the microstructure of the center, Fig. 7, shows a grain of ferrite and graphite surrounded by pearlite in which the graphite exists as plates, together with cementite - phosphide eutectic.



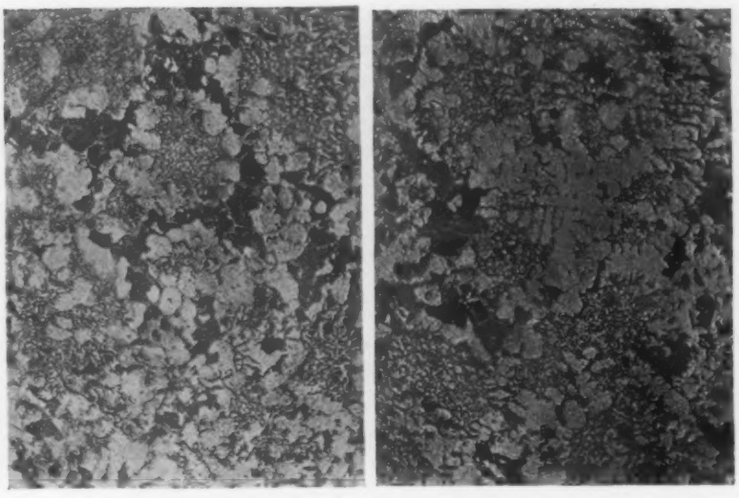
Photomicrographs of the machine - cast metal are seen in Figs. 9 to 15. They represent the hot metal quickly thrown against the surface of a rapidly revolving water-cooled metal mold and removed into the air as soon as congealed or within a few seconds of its



Photomicrographs of cast-iron pipe cast in a rapidly revolving metal mold and removed immediately, all reduced about one-third from an original diameter of 90. Fig. 9 (upper left) is from the inside wall and Fig. 10 (upper right) is from the center of the cross-section of the wall, both as polished. The graphite is very fine on the inside surface (same on the outside) but a little coarser at the center. The absence of plates is noticeable.

Figs. 11, 12 and 13 (lower row, left to right) are the same metal etched representing inside, center and outside, and correspond with Figs. 3, 4 and 5, for the sand-cast metal. They reveal white grains and dentrites of silico-ferrite in a matrix of pearlite, fine graphite and ferrite. A flaw is noticeable in Fig. 13.

contact with the mold. Figs. 9 and 10 show the metal unetched, Fig. 9 representing the inside wall of a cross section of pipe 3/16 in. thick, and Fig. 10 the center of the same section and wall. In these the graphitic carbon is in a very fine condition of crystallization on both the outside and inside walls, but a little coarser at the center, Fig. 10. The contrast between these structures and those of the sand-cast metal, Figs. 1 and 2, is striking.



Photomicrographs of cast-iron pipe cast in a revolving metal mold, all reduced about one-third from an original diameter of 250. Figs. 14 and 15 (left to right) represent the metal near the inside wall and the center section respectively and are from etched specimens. The structure is similar to sand cast (Figs. 6, 7 and 8) but there is much less pearlite.

Taking photomicrographs of the same metal etched, we have Figs. 11, 12 and 13, corresponding to Figs. 3, 4 and 5, the sand-cast metal. In the former, Figs. 11, 12 and 13, the graphite and ferrite are both in fine grains, also a marked contrast to the metal in the sand-cast condition. At a higher magnification the pipe, cast in a metal mold, Figs. 14 and 15, reveal a structure similar to the sand cast, but there is considerably less pearlite present. This is to be expected under the conditions of manufacture.

By allowing the metal in a rapidly revolving cooled mold to remain a few seconds longer, it is possible to develop a slight chill on the surface. In so doing a little more metal is used and the thickness of the pipe slightly increased. It becomes ¼ in. in wall thickness instead of 3/16 in. The presence of the chill is claimed to bestow anti-corrosive quality to the metal.

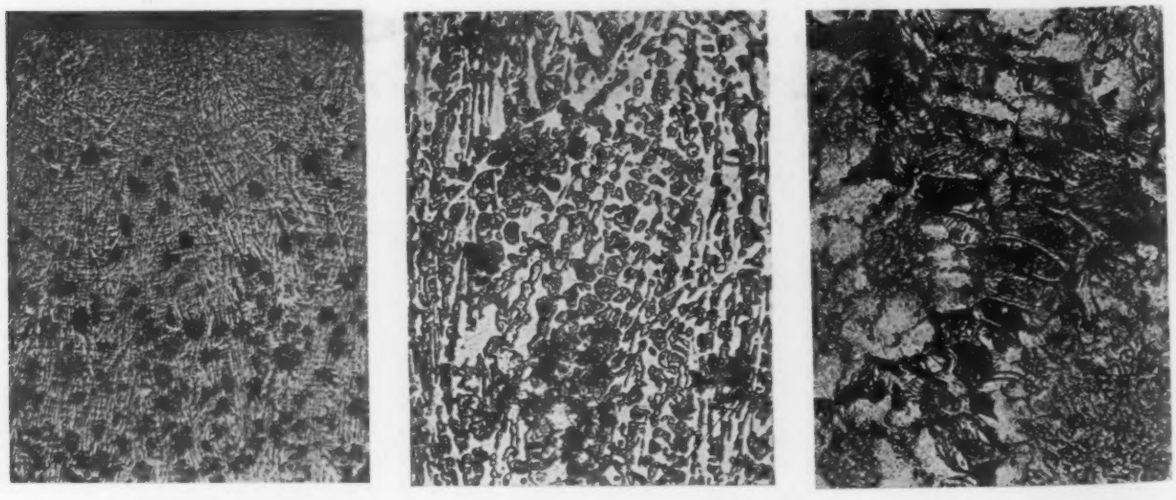
The microstructure of the chilled surface is shown by photomicrographs, Fig. 16, unetched. It consists of cementite and pearlite with a few black spots showing graphite. The same at a higher magnification is represented by Fig. 17. Microscopic examination of the center of metal cast with the chill reveals no essential difference from that cast in the metal mold but quickly removed. Examination of the metal next to the chill reveals the presence of much more pearlite of a distinctly lamellar nature — shown by Fig. 18. An investigation of the composition of the three samples revealed the fortunate coincidence that they were very similar in each case, especially as to carbon and silicon, affording a fair basis for comparison. The following table gives the results of the analyses:

	Sand Cast Metal, Per Cent	Machine Cast Metal, Per Cent	Metal Allowed to Chill, Per Cent
Silicon	2.12	2.10	2.58
Manganese	0.65	0.40	0.45
Phosphorus	0.491	0.575	0.624
Sulphur	0.044	0.081	0.081
Graphitic carbon	3.14	3.36	3.22
Combined carbon	0.33	0.12	0.23

Drillings were taken on the inside of the curve of each pipe.

In the case of the chilled pipe the sample does not represent the chill but only an average of nearly the entire metal section. The silicon is intentionally higher in such pipe. Comparing the machine-cast with the sand-cast, it is noticeable that the combined carbon is less, due to the amount of pearlite present, caused by the conditions of cooling.

Comparison of the photomicrographs of the sand-cast and machine-cast metal reveals the distinct superiority of the latter from the point of view of crystalline structure. It is evident that when the crystals are smaller and more closely knitted together, and especially when the graphite which is a potent weakening constituent is in smaller flakes and not in long plates that the iron itself should be different and stronger.



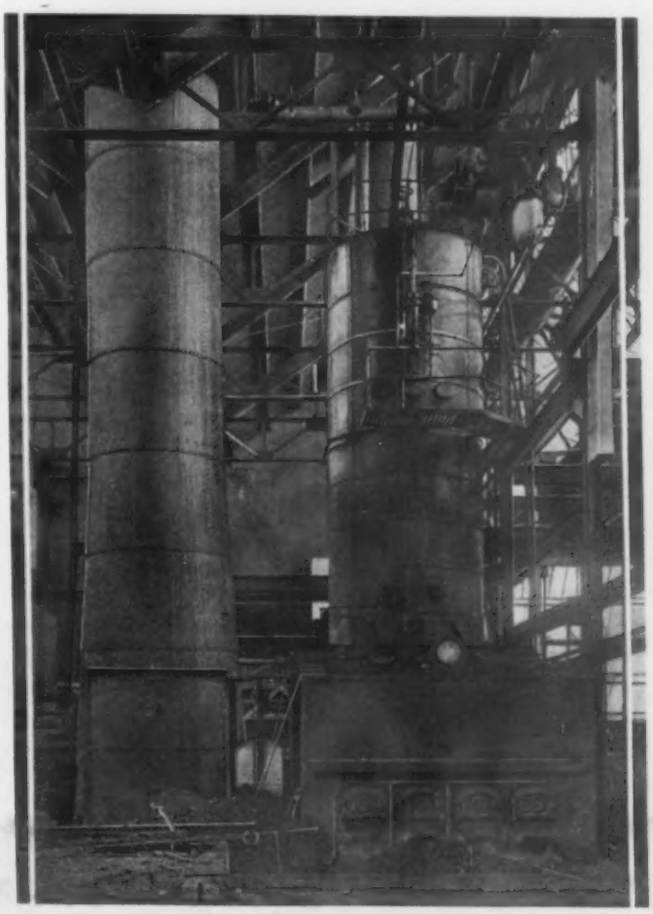
Photomicrographs of cast-iron pipe cast in a revolving metal mold, but allowed to remain long enough to form a slight chill on the surface. Fig. 16 (left) represents the chill of a cross-section at the surface as polished, reduced about one-third from an original of 90 diameters. It reveals white grains of silico-ferrite in a matrix of pearlite and graphite with some cementite eutectic visible. Fig. 17 (center) is the chill etched and reduced about one-third from an original diameter of 500. It shows cementite and pearlite (eutectic structure) with an occasional patch of graphite. Fig. 18 (right) is from near the outside surface of the metal, next to the chill. It is etched and reduced about one-third from an original diameter of 250. Much more pearlite, distinctly lamellar, is visible, with cementite-phosphide eutectic.

Foundry Built for Economical Production

Malleable Plant of Timken-Detroit Axle Co. Has Notable Features Including Utilization of Waste Heat and Equipment for Handling Cores and Sand

SOME time ago the Timken-Detroit Axle Co., Detroit, decided to build a malleable-iron foundry to make its own castings, used in the manufacture of automobile axles, and selected a site in Canton, Ohio, where its new plant has recently been placed in operation. This foundry was designed to meet the special requirements of the company and has an output of 30 tons of castings per day, ranging in sizes up to 150 lb.

It is a modern type of plant in plan and arrangement, being designed both for quality and economical production, and has a number of interesting features. These include the utilization of waste heat from the furnaces for supplying all the power requirements for the operation of both an air compressor and a turbo-generator for generating electricity for the operation of cranes and conveyors and for lighting, heating and ventilating the plant; a very complete sand-handling system; a continuous core oven located high above the foundry floor, resulting in a large saving in floor space, and a unique arrangement of the cleaning-room equipment that results in much saving of labor in handling castings. Electric steel castings for the company's requirements will also be made in the same plant, a 2-ton Heroult furnace now being installed for that purpose.



A vertical water-tube boiler of 300 hp. capacity in the center of the foundry utilizes a portion of the waste heat from the furnaces for generating steam, which furnishes all the power for operating cranes and other machinery driving a turbo-generator and air compressor.

The plant occupies a space 200 x 350 ft. and consists of three connected buildings of brick, steel and concrete construction with the Pond type of saw-tooth roof. A large portion of the sidewalls and the vertical roof sections are covered with factory ribbed glass in continuous Pond steel sash, affording good light and ventilation.

The foundry building is 260 ft. long and 160 ft. wide, and is divided into two separate foundry units with bays 60 ft. wide on each side. Between the foundry bays is a center bay 40 ft. wide, in which is located the melting equipment, boiler for utilizing waste heat from the furnaces, core room and core ovens. An extension on the east side of the main building provides a 40-ft. bay reaching the length of the building, which is occupied by the offices, pattern shop, pattern storage room and engine room, in which the generator and compressor are located.

Adjoining the lower end of the foundry building are two transverse buildings, without separating partitions, 200 ft. long or extending the width of the main building. One of these, adjoining the foundry and 30 ft. wide, is occupied by the cleaning department, and the second, 60 ft. wide, houses the annealing department. The foundry has a clay floor and the annealing and cleaning departments, creosoted wood block floors. The roofs are covered with tile.

The melting equipment consists of three 12-ton air furnaces near the center of the foundry, two on one side and one on the opposite side of the center bay. The furnaces are 21 ft. in length between bridge walls, 5½ ft. wide inside dimensions, and have 4 ft. x 5 ft. 6 in. fire boxes. The location of the furnaces, in close proximity instead of having them widely separated in the two molding units, was considered desirable from the standpoint of economy and operation and a better arrangement for the utilization of the waste heat. All furnace piping is under the floor.

Near the center of the center bay, near the furnaces, is a 400-hp. Wickes vertical water tube boiler for utilizing the waste heat. Heat from the furnaces is discharged into underground flues that join in a main flue and a portion of this heat is carried from the main flue in a branch to the boiler. The remainder is discharged from the main flue into a stack at the side of the boiler, only a portion of the waste heat being required for generating the steam for power purposes when all the furnaces are in operation. It is stated that the waste heat from one furnace is sufficient to generate steam at the required pressure in the boiler. A slight coal fire is kept under the boiler at all times to provide steam

in an emergency, should a quick shutting down of the furnaces be necessary.

Steam for power purposes is generated in the boiler at 140-lb. pressure and this drives the air compressor and a 200-kw. alternating current turbo generator unit consisting of a Kerr turbine directly connected to an Allis-Chalmers generator. The air compressor, which was furnished by the Chicago Pneumatic Co., has a capacity of 1100 cu. ft. of free air per minute.

The exhaust steam from the turbine and compressor will be used in winter for heating the plant. This will be supplied to two heating units installed by the American Blower Co. The hot air will be forced through a main header in the roof trusses and carried down through blast pipes, attached to the building columns, and discharged into the foundry several feet above the floor. In hot weather the blower equipment that distributes the hot air throughout the plant will be used for the circulation of fresh air. Equipment will be installed for washing this air as it is drawn into the system from outside.

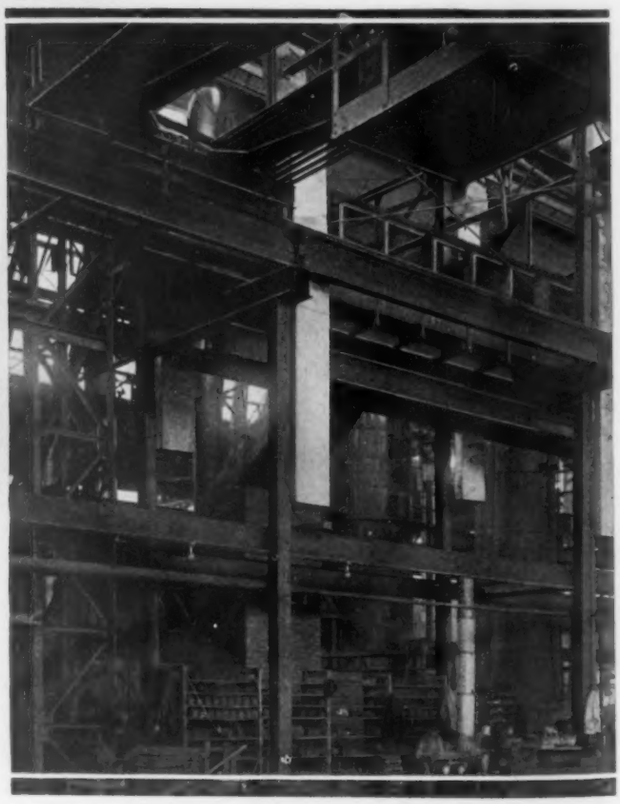
Each foundry bay and the melting bay are served by a 5-ton crane, the one in the melting bay being used for lifting off the roofs and charging the furnaces. Furnace charges are made up in the yard in 3 x 4 ft. rectangular steel boxes and are placed on a truck and run into the plant on a track on a platform, built up in the basement just beneath the foundry floor, and on a level with the yard. An opening is provided in the floor through which the charging boxes are raised by the centerbay crane.

On each side of each foundry bay building columns provide 7-ft. bays or aisles in which the molding machines are located. A monorail trolley track extends the length of each of these bays for handling sand so that the sand is supplied on each side of both molding floors. This sand is conveyed on two electric traveling monorail cranes each equipped with two tub buckets which discharge the sand on the floor between the molding machines. The plans, however, provide for the placing of a hopper over each machine, sand to be dumped into these and discharged through a chute as needed by a molder.

The monorail track extends across the lower end of the foundry floor and out on a traveling bridge on the west side of the plant. This bridge has a 40-ft. span and a runway 300 ft. long. Beneath the bridge is a railroad siding for unloading and storage space for pig iron and coal. Switches are provided in the monorail track within the plant so that the monorail crane can be run from the transverse track up any one of the four tracks that extend the length of the building. An extension of one of these tracks also serves the core room, the sand being dumped by the buckets into storage bins on the core-room floor, having discharge chutes at the bottom.

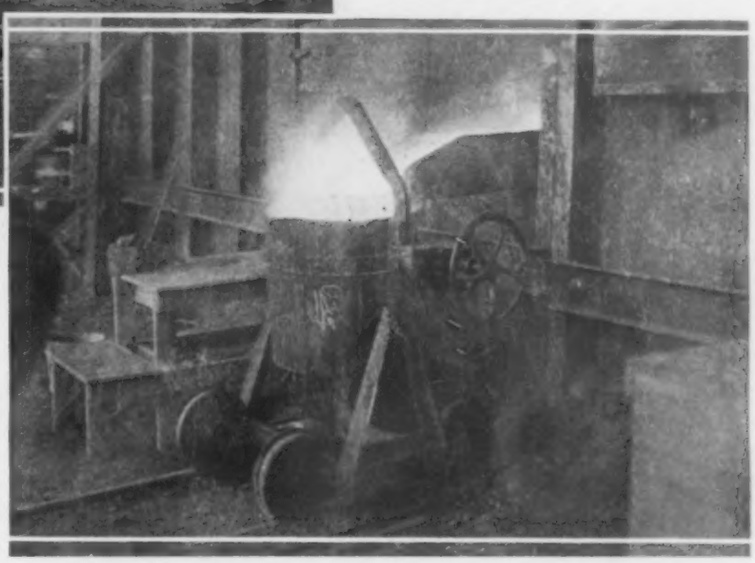
One foundry bay is used for light work and the other for heavy work. In the bay for light work molds for the most part are made on squeezers. The larger molds made in the other bay are made on the floor and on the large molding machine of the roll-over jar-ramming type. The molding-machine equipment consists for the most part of Arcade squeezers and Osborn roll-over and drop-plate machines. Each foundry floor is operated independently and has its own foreman. Molds are poured with hand ladles, and after cooling are carried by the overhead cranes to the lower end of the foundry where they are shaken out over a grating.

Occasionally more iron is melted in a



Bucket elevators carry the sand from the basement to storage bins above the foundry floor from which it is discharged through chutes into the tub buckets of a monorail crane. There are three separate units of this conveyor system, two appearing in the illustration, one each for foundry, core and facing sand.

The continuous core oven is located 24 ft. above the foundry floor, a view of this in the picture to the right being obstructed by the crane runway. The vertical section of the conveyor that passes through the oven, the vertical part not yet enclosed, appears at the left.



An electric charging truck is used for charging annealing pots.
Transfer track, a 3000-lb. ladle and ladle truck shown at the right for carrying metal from one foundry bay to the other.

furnace than is required on the foundry floor which this furnace serves, and in that case it is used in the other foundry bay. For transferring the metal from one bay to the other a transfer track is provided between the two foundries, the metal being poured into a 3000-lb. ladle which is conveyed to the opposite foundry floor on a ladle truck, from which the ladle is picked up with the crane.

The continuous core oven which is located above the core room at the front of the center bay is 95 ft. in length and 24 ft. above the floor level. The conveyor extends horizontally from the floor to the oven and through the latter. The cores are placed on one side of a vertical leg of the conveyor near the floor and are removed from the opposite side when they have completed the circuit. The conveyor is 4 ft. 8 in. wide, and suspended from it on 30-in. centers are carriers, the shelves of which maintain a level position during the circuit of the conveyor. Each carrier has three shelves made of small bars, the shelves being adjustable to accommodate large or small cores. The cores are placed on steel plates on the shelves. The conveyor moves at the rate of 6 in. per minute and it takes 8 hours for it to complete its circuit, making three round trips in a day. It is driven by a 3-hp. motor through a worm drive.

The continuous core oven is coke fired from two fire boxes located under the foundry floor, two flues leading up to different sections of the oven. These flues are brick lined the greater part of the way. The stack is at the extreme end of the ovens and terminates above the roof. A Bristol pyrometer, located on the core-room floor, is connected to the oven.

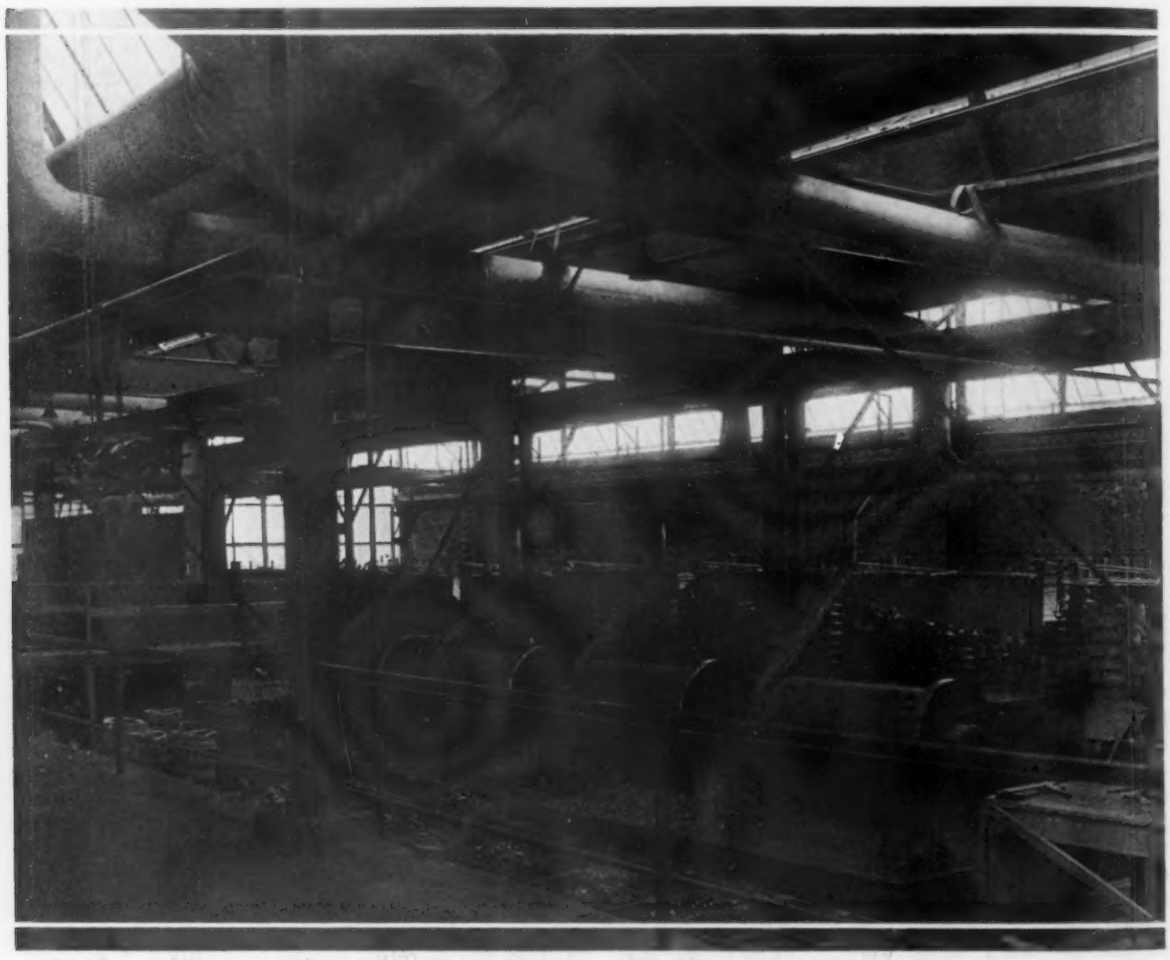
In addition to the continuous core oven, there is a battery of three ovens in the core room. These are 12 ft. deep, 5 ft. 9 in. wide and 7 ft. high. Cores baked in these are placed on large racks that nearly fill the interior space of the ovens and these racks are taken in and out of the ovens on hand trucks with elevating platforms. Some of the cores are made by hand and others on a Hewlett-Demmler core machine. Adjoining the foundry core room and partitioned off from the foundry floor is a core room for women employees. This has a second floor for rest, lunch and lavatory rooms.

Across the lower end of the foundry building is a basement, 200 ft. long, 60 ft. wide and 18 ft. deep, which is used for sand storage and the sand-handling and sand-mixing equipment. Molding sand as it is shaken out from the molds falls through gratings upon a belt conveyor under the basement ceiling, from which it is distributed on the basement floor and left 12 hours or longer to temper. A grab bucket, operated by a monorail hoist, picks it up from the floor and drops it in a hopper that feeds a mixing machine. The tailings and dirt are carried away in a magnetic separator and the tempered sand is deposited in a bucket elevator which elevates it to storage hoppers over the foundry floor. Three elevators are provided for molding, core and facing sand. These storage hoppers are located directly above a monorail track that runs along the directly above a monorail track that runs along the east side of the building and from these hoppers the sand is discharged through chutes into the tub buckets of the monorail crane. These buckets have a capacity of about 2 cu. yd. Sand from the outside yard is brought into the plant with a monorail bucket conveyor and dropped through holes in the foundry floor to storage bins in the basement.

The floors of the cleaning and annealing departments in the rear of the foundry are 8 ft. below the foundry-floor level. Having these departments on a lower level was made practical because the plant is located on a hillside, and the lower floor level permitted an arrangement of the cleaning equipment that effects considerable economy in the handling of castings during cleaning. On a platform in the cleaning department at the edge of the foundry floor is a battery of five tumbling barrels, the tops of which are on a level with the foundry floor so that the castings do not have to be lifted to be placed in these barrels but are shoved directly into them from the floor. From these tumbling barrels castings are discharged down chutes at the side to sorting benches, and are ground before being annealed. During the grinding operation the castings are handled in the cleaning room on wooden racks moved by elevating platform trucks.

The annealing ovens are arranged in a line along

the annealing room. These ovens, 12 in number, are 21 ft. deep, 15 ft. wide and 9 ft. high. They are charged with a Baldwin electric charging truck. After annealing, the pots are lifted by a 5-ton crane which serves the annealing department and are shaken out on a grate on a platform at the side of the cleaning department 8 ft. above the floor. The packing passes down chutes into buckets and the crane carries it back to the packing floor. Another battery of four tumbling barrels is located at the side of this platform and above the sorting benches for cleaning the castings after being annealed. The elevation of these tumbling barrels permits the dropping of the finished castings from the barrels down to the soft iron sorting tables below the barrels. Here the castings are sorted and packed for shipment and taken to a loading platform through a door at the side of the cleaning room. The cleaning equipment includes two sand-blast tumbling barrels and two sand-blast rotary tables, one of each of these being provided for hard castings and one for soft castings.



The annealing pots are shaken out on a platform 8 ft. above the cleaning room floor. The castings pass to adjoining tumbling mills on a lower level, and from these mills down to sorting benches, eliminating hand lifting

The plant is provided with six monorail hoists, three of these being tub monorails and two double hook hoists for various handling purposes, and one single hook hoist, the latter in the basement for sand handling. The hoists are of 4-ton capacity. The sand-conveying equipment was furnished by the Link-Belt Co., the monorail hoists by the Sprague Electric Works, the electric traveling cranes by the Northern Engineering Works, the sand-mixing machinery by the Standard Sand & Machine Co., the tumbling barrels by the Whiting Foundry Equipment Co., and the sand-blast equipment by the American Foundry Equipment Co. The plant was erected by the Canton Bridge Co. Details for the plans of the plant and the sand-handling equipment were prepared by the H. M. Lane Co., Detroit. A 40 x 40 ft. extension is now being built to the plant to provide a molding floor for steel castings.

The plant occupies a 28½-acre site, a portion of which is used by the employees for gardening purposes, and another section will be fitted up shortly by the company for an athletic field for its workmen. The company has made arrangements with a real-estate company to build houses for employees on a portion of its site. Eighteen residences of a modern type are now being erected which will be sold on the installment plan at prices ranging from $3,000 to $3,400, the monthly payments being small enough to make it possible for an employee to buy his own home.

Electric Steel Industry of the United States and Canada

Discussing the "Electric Steel Industry in Canada" at a recent meeting of the Manitoba branch of the Canadian Society of Civil Engineers, A. M. Tirbutt pointed out that the wonderful growth of the electric steel industry in Canada and the United States during the past few years is best shown in terms of output. From 18,309 tons made in 1912 it jumped to a total of over 225,000 tons in 1916, and taking the units installed during the latter part of that year and those at present under construction, the total output for this year, at a conservative estimate, should easily reach the 500,000-ton mark.

Some Latter-Day Problems of the Foundry

In Part They Grow Out of War Conditions in Industry—Others Are New Phases of Long Familiar Questions

BY DR. RICHARD MOLDENKE

Few industries in the world are so dependent upon quality in raw materials of ordinarily low cost as is the foundry. When the present cataclysm shall have passed and things become normal, the foundryman will feel as if he has awakened from a nightmare. While he shares with most of the industries the shortage of labor, he has to draw upon a division of skilled workmen that cannot be trained in a week or a year. Furthermore, unless the iron and fuel bought is of proper quality, he starts with a handicap making the production of high grade castings a sheer impossibility. The raw materials must be "good" and not merely "near good."

Since, however, results are wanted and not complaints, a few thoughts bearing upon the present foundry situation may not be amiss. What is given here is based upon the observations of the writer in his professional work since the problems of the foundry have become acute. When called in to diagnose the cause of bad castings as entirely apart from high shop costs, the first thing that strikes the close observer is the general deterioration of most of the raw materials received in the foundry. Since it is almost impossible to make rejections and buy elsewhere, it becomes a problem of what to do under the circumstances. The items may therefore be taken up one by one.

Poor Molding Sand

Probably the first trouble experienced had to do with poor molding sand. Whether the foundries suddenly decided to lay in big supplies, or the sand pits had become bare of the cream of this essential foundry raw material from competition during hard times, the fact remains that as the rush came on everything went. Shiploads and trainloads of molding sand arrived at destination, were stocked, and in regular course this new sand arrived on the heaps. Very soon the castings showed the effect of poor bond, the metal cutting and the heat destroying the fine surfaces above the rising iron in the mold; copes dropped, etc. Investigation was usually started too late and the sand heaps were in exceedingly poor condition. The only thing that could be done to save the situation until arrangements for better sand could be made was to throw clay wash on the heaps regularly to work in new bonding material. Where possible, the foundryman was advised to go to the sandpit of the dealer and select his material even if he had to pay a bonus.

Remedies

This situation, prevalent in most parts of the denser foundry territory of the country to-day, points to two lines of activity: first, the study of molding sand as received and as in daily use; second, the improvement of the sand at the pit, or, if necessary, entry into the manufacture of artificial molding sands.

The origin, functions and testing of molding sand are now pretty well understood, the latest textbooks giving light upon the subject. Wide-awake foundrymen can, therefore, have tests made on the bonding power of their sands as shipments come in, and also of the separate heaps on the floor. A limit of strength must be fixed below which the heaps may not be allowed to drop. Further, specifications should be made requiring a given minimum of bonding value in new sand even if such sand commands a premium. Molding sand is one of the fundamentals of the foundry industry and one had better commence right rather than have a defect follow all through the subsequent operations. As stated above, the addition of a very fat and refractory clay to the heaps in the foundry is about the only means of correcting them until a better grade can be brought on. It is to be hoped that the sand merchants may give the matter attention before the foundrymen do this for them, otherwise it will be only a question of time when an artificial product finds a footing in the industry. The foundryman cannot afford the loss of castings which he can directly trace to outside sources.

Higher Sulphur and Oxygen

Next would come the metal problem. On the whole, the difficulty is not so much one of deterioration of pig iron owing to the rush, as from a different situation. The furnaces are working steadily and fairly well, so that here it is more the price that hurts (and this is loaded upon the customer), besides the heartbreaking delivery problem. The real difficulty, however, lies in the pig-scrap ratio which directly affects the value of the pig iron used. If, instead of taking 60 per cent pig and 40 per cent scrap, the proportions are reversed the same quality results cannot be expected. In spite of the high levels to which all the scrap metals have climbed, there is every temptation to use heavier scrap percentages to cheapen the mixture. Cases with 80 per cent scrap are common today, and indeed the results show it. Even in the case of the scrap varieties there is to be found a variation in prices dependent upon the supplies of the region. In some places car wheel scrap is abundant; in others stove plate can be picked up at reasonable figures. Necessarily, with the pig iron levels existing it would be strange if such chances are not being utilized regardless of the ultimate consequences. The two items of the sulphur and oxygen content in iron castings are therefore climbing steadily and will later on confront the industry with disastrous effect.

In view of the above, two items must be watched with the closest attention; namely, the fuel used and the melting practice. When the fuel aggravates the sulphur situation it is bad enough, but if added to this the melting practice is calculated to bring out cold iron, this will mean abnormal sulphur figures besides oxidized and hence defective work from the standpoint of shrinkage, gas holes, cracks, etc.

Fuel Difficulties

The fuel problem to-day is a serious one. Carload after carload of coke is received in foundries with ash up to 14.50 and sulphur near the 1.50 mark. What is the foundryman to do? He may protest, but he gets all sorts of excuses. He is told that others are having no trouble with the coke, which may be a source of satisfaction, but investigation usually shows that the class of work in question had no machining of consequence and could stand defects of a pretty serious nature before rejection would take place. With such coke, advice is difficult. All the foundryman can do is to

watch his cupola so that he may get the hottest iron the coke is capable of producing; further, that melting is done at the proper bed level to prevent oxidation of metal, which in raising the freezing point means short "life," poor feeding, gas holes, etc.

Right Cupola Conditions

Perhaps a short review of the cupola conditions necessary for good work may not be amiss here. The position of the bed is the crucial point. Depending upon the blast and cupola cross-section relation, will there be a certain velocity of the gases upward? There will be one bed level for the best results. This is when the air coming from the tuyeres has had its oxygen completely consumed, but in doing this has not yet allowed much of the carbon dioxide formed to become carbon monoxide—with the rendering latent of a lot of the heat. This point is incidentally the position of maximum temperature and is independent of the weight of the bed. It is dependent only upon the height necessary to allow the above mentioned reactions. The best guide the foundryman has in getting his coke bed right, is to time the "first iron." With conditions of charging normal, when putting on the blast, molten iron should be seen to trickle past the tuyeres in about six minutes. As this drops upon the bottom and comes out of the tap-hole attention should be given to note when a stream begins to run over the spout into the ladle or on the floor. This should take place between eight and ten minutes. Then the bed will have been right. If in six or seven minutes, the bed should be raised, and conversely if the first iron comes in twelve minutes or more, the bed must be held lower as coke is wasted otherwise.

Poor Practice Rather Than Poor Coke

Right here, when speaking of "normal charging conditions," many a foundryman is to-day suffering from poor coke because of his own poor practice. Going about the country many a cupola will be seen in operation the charging door of which is perhaps only 8 ft. above the bottom plate, whereas it should be at least 15 ft. The heat imparted the iron in the melting process may be divided into three parts: that needed to bring it up to the melting point, the heat necessary for the actual melting, and finally the additional amount to superheat the molten iron to the proper point. In the metallurgy of cast iron it happens that most of the heat is required in bringing the metal to the melting point, or somewhere over white heat. All this heat must get into the iron as it passes from the charging door downward into the zone of melting. It will naturally make quite a difference whether the column of metal and fuel in the cupola is 5 ft. above the top of the bed or 12 ft. Furthermore, when the bed has burned through properly and the cupola has been charged, it also makes quite a difference in the temperature of the first part of the heat whether the fully charged cupola has been allowed to stand an hour or more, or blast is put on at once. With the ash content in coke at about 8 per cent this situation is perhaps not so marked; but when the ash approached 12 per cent, matters begin to be serious.

Hence, the foundryman should observe his practice closely and see whether he cannot increase the height of his charging door, if too low. Also, he should charge very early in the day, if possible, to allow the cupola a chance to warm up for at least an hour, and preferably two. In this way the coke may be high in ash and sulphur and yet give serviceable results. Charging early naturally brings up the question of daubing up the cupola. Unless the brick in the melting zone is chipped off clean, so that a proper contact is established between brick and clay daubing, the latter will not stick when under the high temperatures of the melt. Any slag between brick and daubing will soften and allow the patches put on to slide down. The result is not only a thick, pasty slag and bridged tuyeres, but a further cutting into the lining. Furthermore, it is necessary to use the highest grade of clay for daubing purposes, as the idea of daubing-up is to restore the lines of the brick-work, and this cannot be done successfully with inferior clays.

Preserving the Level of Cupola Bed

Granted that the cupola bed is of the right height, the next point is to see that it stays at the right height during the entire melting operation. That is to say, as the top of the bed burns away in furnishing the heat necessary for melting the metal charge upon it, the level must be restored by the intermediate coke charge coming down after the iron has melted away. This intermediate coke charge is a matter of weight and not height, as was the case with the bed, for here it is a question of burning enough fuel to melt the metal over it. Again, as the bed dare not be lowered very much before the ideal conditions at the proper point are spoiled, the iron charge must not be too large. This requires further explanation:—With ordinary blast and cupola cross-section conditions the height of the coke bed is 22 to 24 inches above the top of the tuyeres (it is understood that but one row of tuyeres is used). The oxygen of the blast will therefore vary from maximum at the tuyères to zero or at least minimum at the top of the bed. Similarly, the carbon dioxide will vary from nothing at the tuyères to maximum at the bed level, with carbon monoxide just forming. It is quite evident then that just below the top of the bed—say six inches—the ideal conditions will not have been reached as yet, some oxygen being present, the carbon dioxide in lower percentage, and incidentally the temperature not at the maximum. Hence there is danger if the metal has to melt at this low level of cold and oxidized iron. In practice it is not advisable to allow the bed to lower more than four inches.

Formula for Metal Charge

This at once gives the standard metal charge for any cupola; that is, with the understanding that not more than 4 in. of coke may be burned away each time a metal charge is melted—and this 4 in. of coke of the bed being replaced by the intermediate fuel charge—the weight of metal allowable for each charge will be the amount which can be properly melted by the weight of four inches of coke in that cupola. In practice, everything being right, there is usually ten times as much. Hence the foundryman has only to find the weight of coke filling four inches in height of his cupola and multiply this by ten to know the standard metal charge he must use. This does away with a big first charge and discussion on big and little charges, etc.

And yet how different things are in actual practice when a comparison is made between the plants one sees or finds described in the technical press. For the same diameter cupolas one foundry may use an 8000-lb. charge of metal and another foundry 3500 lb. In one case the foundryman doubles the first charge, in another he also doubles the first intermediate fuel charge. In nearly all cases more coke gets into the cupolas than the owners imagine. This may be the saving condition where big first charges are used, and considering the class of men employed to attend cupolas such coke charged unnecessarily covers a multitude of sins of poor distribution of metal, mistakes in weighing, etc.

Factors in the Fuel Ratio

Unfortunately, however, too much fuel means cold iron. just as much as too little, yet it has the advantage of unoxidized metal, which is not the case with

a low bed. The importance of getting just the right amount of fuel for the cupola can be seen from the above. Where more than the required amount of coke has to be used to care for poor charging methods it means an abnormal sulphur increase in the castings produced. It also means more ash to be fluxed away, the chances of dirty iron and a higher fuel cost. While it is very poor policy to skimp with the fuel, it is not necessary to throw money away. The foundryman should therefore give close personal attention to the charging floor of his foundry and see that the necessary amount of brains is diverted to that department.

The proportion of fuel and metal, given as one to ten, the bed excluded, will of course vary somewhat with the character and heating value of the coke, the length of the heat, nature of the metal charges, etc. The foundryman should watch the scoring of his cupola every day to see whether this is confined to less than a foot, as in good practice, or whether the evidences begin at the tuyères and run up 3 ft. or more. The metal should also be charged evenly and in sequence of steel first, pig and heavy pieces next, and the lightest material for the top. Such a situation should be self-evident.

Air Furnace Troubles

If the cupola is run under difficulties today the air furnace is in a similar predicament. Anything in coal goes, whether the sulphur is up or down, lumps are conspicuous by their absence and the slate to be seen tells of high ash. The mines are evidently being thoroughly cleaned out in preparation of a coming competitive campaign when things are normal again. In addition to coal troubles there are the dearth and deterioration of refractories to face. Firebrick is a scarce article of commerce today, and hence furnaces and ovens are run to the last ditch, with the usual consequences to the castings made. Here the truth of the saying about "the stitch in time" finds it application, for repairs kept up to the minute mean a safe and economical furnace. The same situation in regard to scrap-pig percentages is met with in air furnace practice to-day as in the cupola, and hence the sulphur is climbing steadily. The low efficiency of the air furnace must eventually bring the open-hearth method of melting into the foundry. While the open-hearth is familiar in advanced malleable practice, the gray iron foundry has tenaciously clung to the air furnace where furnace melting is used at all. But with the excellence in product obtained and at a cost but little over cupola iron the first cost and greater operating skill required will not prevent the eventual introduction. Probably the first foundries to take the matter of open-hearth melting for high class gray iron work up for trial will be the plants forced into making steel castings by their customers. With an open hearth equipment at hand odd heats can be made at any time and cupola and hearth furnace results and costs compared.

The Electric Furnace Gives Promise

On the credit side of the rather gloomy situation for the foundry may be placed the rapid introduction of the electric furnace—the only method free from pig-scrap proportions, high sulphur stock, oxidized metal and bad fuels. While it is not yet applied commercially for gray iron casting work, the elements of cost are being learned, as also the many minor kinks every process seems to embrace. The largest amount of heat to impart to the metal being that up to the melting point there is no reason why this should not be applied in a soaking pit, whence the charge can be transferred into the electric furnace for melting, super-heating and final purification. With the knowledge gained while perfecting the electric steel casting process the gray iron or specialty iron foundry should benefit greatly thereby eventually.

If there is any time for the introduction of molding machinery it is now. Wages are so high and conditions comfortable that the men themselves see the desirability of machine work in view of the scarcity of labor. The plants making this line of machinery cannot fill their orders fast enough, but, in spite of this, there is a gradual improvement in plant equipment noticeable in this direction. With the increasing solidity of the machines themselves and the attention being given by the makers to the peculiar problems of the foundryman mutual benefit is resulting.

The foundryman, therefore, must put up with his troubles as best he can and be positive that his end of the business is up to date. He can then, at least, do as well as the next man. If his own practice is poor it is quite certain that the present difficulties will put him in a very bad position with his customers for the day when things become normal again. He must live from hand to mouth, as it were, doing his share as best he can and at the same time keep up his courage to face the great readjustment bound to come sooner or later.

Exhibit of Safety Devices at New York

In conjunction with the convention of the National Safety Council, an exhibition of safety devices took place at Grand Central Palace throughout last week. Two of the largest spaces were reserved by the American Museum of Safety and the National Safety Council, under the combined auspices of which the exposition was held.

Exhibits of safety plans and specifications of the plants of the Illinois Steel Co., and a miniature of the plant of the American Rolling Mill Co., Middletown, Ohio, were conspicuous. The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., had an exhibit of safety devices, including a guard for milling cutters, guards for saws, a safety device for grinder heads, an overhead belt guard, a safety ladder, safety devices for punch presses, a welder's helmet, etc. The Research Corporation, 63 Wall Street, New York, gave a demonstration of the Cottrell electrical precipitation process for collecting and recovering dust from blast furnaces, lead and copper converters, etc. The Commonwealth Steel Co., St. Louis, showed models of its steel underframe for passenger cars. The Western Electric Co. gave a working demonstration of its flood lamps for lighting industrial plants for night work. The Carrier Engineering Corporation, New York, showed its temperature and humidity control apparatus, and demonstrated their adaptation to industrial plants. The Powers Regulator Co., New York, also demonstrated an automatic temperature-controlling apparatus for industrial purposes. Power-transmitting appliances were shown by the Standard Pressed Steel Co., Philadelphia. The Safety First Supply Co., Pittsburgh, had an exhibit of its products. The Zeh & Hahnemann Co., Newark, N. J., gave a demonstration of safety devices on power presses. John Gibson, Detroit, showed a newly patented article, a chuck guard. The Safety First Mfg. Co., Washington, D. C., showed Bull Dog shaft couplings.

There were several exhibits of helmets, respirators and similar devices. Walter Soderling, Inc., New York, among others showed a dust respirator. The Multi-Metal Separating Screen Co., New York, the Protecto Safety Appliance Co., Newark, N. J., and the American La France Engine Co. showed safety helmets.

Safety goggles were displayed by a number of companies, including the Merry Optical Co., Kansas City, Mo.; the Julius King Optical Co., New York; the Standard Optical Co., Geneva, N. Y.; T. A. Willson & Co., Inc., Reading, Pa.; F. A. Hardy & Co., New York, and the Strong, Kennard & Nutt Co., Cleveland.

The Kny-Scheerer Co., New York, had an exhibit of an emergency hospital of a type adapted to industrial plants. Pure water for workmen was emphasized by the Puro Sanitary Drinking Fountain Co., Haydenville, Mass.; the Lungmotor, an oxygenizing device for resuscitating those overcome by gas fumes, was exhibited by the Life Saving Devices Co., Chicago.

Practical Welfare Work in Foundries*

Specific Forms Developing Better Personal Relations Between Employer and Employee Irrespective of Size of Plant

BY S. W. ASHE

Many large foundries operated by the iron and steel industry for some time have carried on welfare work. Many plants were located at some distance from a town and it therefore became necessary practically to build a town adjacent to the plant. Streets were laid out; sewerage systems, lighting systems and water supply installed; hospitals, Y. M. C. A.'s, schools and libraries were built, and many playgrounds were laid out. This was done with the realization that the average human being requires something more than the ordinary routine of work, refreshment and sleep to be contented; for if the worker does not have his social needs provided for he is likely to seek employment elsewhere or dissipate. Foundries that have undertaken this work are still continuing it, indicating that they feel it has been wise. However, where so much has been done it is difficult for the small plant with limited means at its disposal to know just what to do. The following ideas covering this matter may properly be divided into two parts: 1, covering the personal relations between employees and employers which apply to any plant irrespective of size, and 2, covering specific forms of welfare work which do not involve great expense but which bring results and which are within reach of the small foundry.

Committee of employee-gardeners receive instructions from an agricultural expert

Labor Turnover

At a recent meeting of the safety and health section of the National Association of Corporation Schools, held in Buffalo, statistics were presented showing that from 50 to 60 per cent of the accidents which occur are due either directly or indirectly to those employed less than six months. These accidents are the result of carelessness or inexperience of the new men in either injuring himself or someone else. It is evident, therefore, that if means can be developed for holding workers in employment for longer periods or decreasing labor turnover to reasonable proportions, accidents will automatically be reduced 50 per cent.

In addition to heavy accident rates we find in plants with a high labor turnover much restlessness, poor esprit de corps, little initiative and low efficiency. In plants where some thought has been given to this problem, it has been found that while wages and hours of work have some bearing, the personal factor also has considerable weight. In the smaller plant, where the manager is personally acquainted with practically all of his men, there should be a better relationship than in larger plants where this co-operation between executive and worker is practically impossible. Commenting on this point, E. W. Rice, president of the General Electric Co., wrote as follows in the *General Electric Review*: "There is today a serious lack of mutual understanding between the manufacturer and the wage earner and while considerable progress has been made in bringing about more harmonious relations, the situation leaves much to be desired. This lack of understanding and confidence is largely due to a lack of knowledge of each other and the knowledge is lacking in the manufacturer as well as the wage earner."

It is evident that interest must be mutual and the desire for co-operation must exist to an equal degree in order to obtain maximum efficiency. If an employer makes unusual efforts to educate his employees, to protect them against accidents, sickness, old age, to stimulate thrift, initiative; if he pays them a fair wage, etc., and finds his employees indifferent, taking things for granted without any attempt at reciprocal co-operation, there is something wrong. There must be equality of interest and if this interest cannot be brought about, there are certain wrong policies which are being followed by subordinates.

As an illustration, few in the industry realize the importance of little things of a personal nature, whereas it is usually the little things which cause the most trouble. A foreman may have an employee who is clever, who is popular with his fellow employees and who perhaps has rather positive ideas. Rather than use, to advantage, this latent energy and originality which the employee possesses, the foreman may resent the characteristics in the man and even though he is an excellent workman, doing his work probably with care and with greater efficiency than other employees, will discharge the man for some slight infraction of rules. Such actions not only arouse great bitterness in the discharged workman, but also a feeling of resentment creeps in among the remaining workers. Where before there was some loyalty in the department, a feeling of dissatisfaction starts, resulting in time in demoralization of the department.

Factors Which Influence Contentment

There is no factor which means quite so much to an employee as the factor of stability. Where attempts are made to regulate production so that employees are not periodically out of work, a better condition is created than in those places where a continual feeling of uncertainty exists. High labor turnover is the cause of more ills than it is ordinarily given credit for. Employers are doing much at the present time to minimize it. Service bonuses and pension systems have been introduced, besides the practice of some corporations of making it imperative that every executive must come up through the ranks. Where the employees in an organization are frequently changing the new employee does not have time to become acquainted with the human side of the business before he is off seeking employment with a new concern. With a view to bettering conditions some companies have taken from their foremen the privilege of discharge, and when an employee does not fit for some reason in a particular department, he is given another trial in another depart-

*Paper read before the foundry section meeting of the National Safety Council, New York, Sept. 13. The author is in charge of the educational and welfare department of the General Electric Company, Pittsfield, Mass.

ment. In this way the longer an employee remains the better opportunity he has of understanding the service of the particular organization in which he is employed.

Characteristics Desirable in Social Workers

A welfare worker's success at the present day depends largely upon his ability to understand people. In business this also applies, which is the reason why so few people become executives. Some people call it a knack, others say he is a good mixer, but it is seldom we find the combination of a mild nature and ability to get results. It seems to take a certain amount of push to put things across and in doing this it is difficult to keep from treading on someone's toes. It therefore requires, in a successful welfare worker, considerable caution and diplomacy, besides steadiness and common sense at critical moments under pressure in order to meet unusual situations as they develop. As few social workers possess all these qualifications, they are only successful as a rule to a degree.

Primarily a welfare worker must give his life to his work. Otherwise he is useless in meeting the continual strain on his sympathy, enthusiasm, energy and initiative which is constantly made. He soon learns to compromise and that progress can be made only in slow easy stages. For this reason he must have several matters under development at the same time. Where an activity is once started it must be given time to grow. A plant which is dug up and its roots examined every few days to see what growth it has made soon dies. So it is with social activities constantly meddled with. Then again organizations can only readjust and assimilate at a certain rate and it is better to spend excess enthusiasm and energy in more thoroughly investigating and preparing a new activity in its preliminary stages than to spend too much time creating an endless chain of new methods and new ideas which have not been thoroughly thought out and adapted to an organization. Things must fit; they may require some adjustment, but there must be a real need for them. They must have a personal appeal; there must be permanency or stability to them. They must be organized so that they practically run themselves, and so that they will not require constant attention, expense and support.

A raising bee in 40 minutes erected 800 ft. of fencing and laid 1000 ft. of water pipe

What Counts in Welfare Work

We can always trace some good in any form of welfare work, depending upon the angle we view it from, but the question naturally arises as to what counts the most. At the present time much is being done, and to weigh this matter properly we should place ourselves in the position of the average employee and ask what really counts the most and what things in emergency we could dispense with. It is evident from this viewpoint, with the present high cost of living and with war conditions, that things which bear a direct relation to the employees' salary are the things which count the most. These are the things which necessarily exert the greatest holding influence. Company gardens, bonuses, selling articles, such as coal and insurance at cost, have the greatest weight these times. Where we get employees in the habit of saving their money and purchasing in bulk at the proper season, we are not only establishing the fundamentals of thrift, but at the same time we are solving many of the problems of labor turnover. The average workingman has a large amount of free time at his disposal which should bring him in, if properly used, a fair revenue, and when fall comes if this man has his cellar full of winter's coal, wood and vegetables and is in good physical condition as a result of his out-of-door activities, his whole viewpoint towards life and his company will change and he will stick to his job.

Service Bonuses

Service bonuses, as the name implies, may be offered for varying degrees of service, such as five, ten or twenty year periods. The bonuses are usually paid in cash, although some companies give stock or part cash and part stock. The bonuses vary from 5 to 20 per cent of the individual's salary and are paid annually or semi-annually. The same idea has been worked out in connection with apprentice courses where a bonus is given for the completion of the course. It is found that such bonuses do have a restraining influence. On the other hand, when labor trouble occurs, these bonuses as well as pension systems have very little restraining effect.

Company Gardens

The idea of company gardens also is not new, as many steel companies for some time have taken part of their land, ploughed and harrowed it, arranged for watering and policing. Such an arrangement is equivalent to creating a medium whereby the employee can use his spare time to advantage and obtain a revenue which reduces considerably his living expenses. The employee benefits by being in the open air, his spirits are better, his health is better and he is more cheerful and contented. Usually it is well to delegate some single individual to be responsible for such an activity, although when the gardens have been assigned and are under cultivation it is important to have a committee of employees take general charge, having an exhibit at the end of the season.

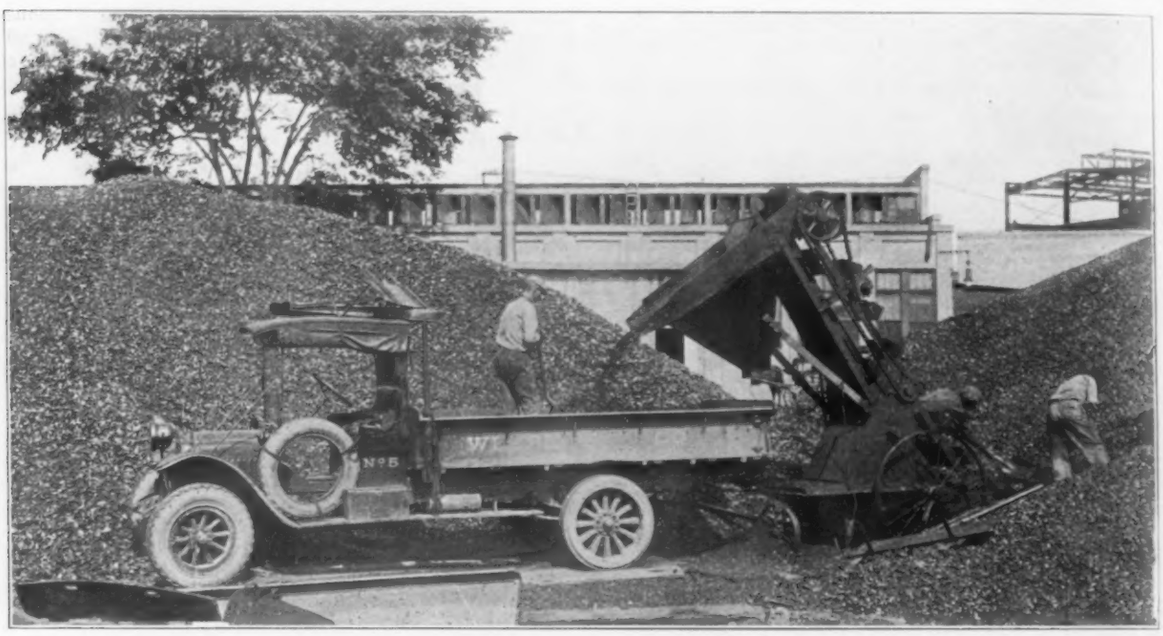
Accompanying illustrations illustrate gardens at the Pittsfield works of the General Electric Co. Three hundred gardens, 50 x 100 ft. in size, were assigned. Each gardener signed an agreement stating that he would take proper care of his garden. The gardens were adjacent to the works and their use was offered by the widow of the late William Russell Allen. Out of the entire plot only one piece has not been cultivated. This was very stony and was assigned late. It was necessary to build 800 ft. of temporary fence and run 1000 ft. of water pipe line into the property. A "raising bee" was therefore held one Saturday afternoon, the company supplying old lumber and pipe. It took just forty minutes to complete the work. Care has been taken to check these 300 plots and with the exception of one employee, who was dropped, every one has remained with the company and taken good care of his plot. While it is true that this covers only a small percentage of the employees and refers to a period of only three months, the unusual interest which has been taken shows that it is a form of welfare work which benefits the employee considerably and does bear a definite relation to labor turnover.

Selling Coal

Coal the past winter was difficult to secure and the price was high. Some companies have tried the experiment of co-operating with their employees in selling coal at cost. At the Pittsfield works we formed a Coal Club and sold 2000 tons of coal at cost. The

coal was screened with an automatic loader, as shown in the illustrations, and delivered with motor trucks and teams. In securing the coal about one-half of the coal was purchased at a low figure and the other half was secured at a somewhat higher figure, as it was purchased on a rising market and it was necessary at that time to buy fancy coal or take nothing. Nevertheless, the employees supported the proposition exceedingly well and it has had the effect of steadying the local market, due to increasing the amount which would normally have been received.

As before stated, when fall comes and the average employee has his cellar well supplied with coal and vegetables it is going to give him a chance to catch up and accumulate. This sort of welfare work reaches. Many of our other forms of work are desirable and the men are generally interested in them, but they exert a holding influence to a less degree than the grouping discussed.



In loading for distribution the 2200 tons of coal of the Coal Club a portable elevator was used, discharging across a screen into the truck

Large New Japanese Steel Plant

What is called one of the largest steel organizations in Japan is just about to complete its organization. U. S. Consul General George H. Scidmore, of Yokohama, reports its plans. It is to be known as the Oriental Steel Mfg. Co. and has been projected to take over the rights obtained by the Sino-Japanese Industrial Development Co. and to work the Taochun iron mine in Anhui. The promoters delayed the organization of the company to make sure of the official bounties under the steel industry encouragement law just promulgated.

The company plans to establish a blast furnace to produce pig iron at the rate of 170,000 tons a year, a steel mill with a capacity of 100,000 tons of steel ingots, a rolling mill to produce more than 75,000 tons of various shapes and other units which will turn out miscellaneous products. There will be two blast furnaces with a capacity of 250 tons a day each. In the steel plant three furnaces will be installed with auxiliary equipment. The company's experts for some time past have been investigating possible locations, and Imari, Saga prefecture, has been finally approved as the site.

At present the output of the Trumbull Steel Co., at Warren, Ohio, is about 70 per cent tin plate and 30 per cent black and galvanized sheets. Formerly the larger part of the output of this company was sheets, but owing to the heavy demand for bright plate for containers for perishable foods, the company has been increasing its output of tin plate and cut down sheets.

Gear Manufacturers Meet in Chicago

The semi-annual meeting of the American Gear Manufacturers' Association was held at the Edgewater Beach Hotel, Chicago, Sept. 13, 14 and 15, about 40 gear manufacturers from various cities being present. The membership of the association consists solely of corporations, firms or individuals actively engaged in the manufacture and cutting of gears for the use of others, and its purpose is the development, standardization and improvement of the gear industry. Standardization, such as has been effected in electrical motors, was given special attention at the meeting.

The executive committee of the association met Sept. 13 and on the following day the general meeting was called to order by F. W. Sinram, Van Dorn & Dutton Co., Cleveland, president of the organization. During the convention papers were read as follows:

"Advertising Don'ts," J. C. McQuiston, R. D. Nuttall Co., Pittsburgh.

"Heat Treating and Hardening of Gears," W. H. Phillips, R. D. Nuttall Co.

"Inspection of Gearing," B. S. Waterman, Brown & Sharpe Mfg. Co., Providence, R. I.

"Spur Gearing by the Rotary or Disk Cutting Process," H. E. Eberhardt, Newark Gear Cutting Machine Co., Newark, N. J.

"Spur Gears by the Shaper Method," F. Schneider, Van Dorn & Dutton Co., Cleveland.

The afternoons of Sept. 14 and 15 were devoted to entertainment furnished by the Chicago members. The officers of the association, aside from Mr. Sinram, are: H. E. Eberhardt, vice-president; F. D. Hamlin, Earle Gear & Machine Co., Philadelphia, secretary, and Frank Horsburgh, Horsburgh & Scott Co., Cleveland, treasurer. The executive committee consists of F. W. Sinram, F. D. Hamlin, H. E. Eberhardt. Frank Horsburgh, Milton Rupert, of the R. D. Nuttall Co., George L. Markland, Jr., of the Philadelphia Gear Works, and Biddle Arthens of the Simon Mfg. Co., Pittsburgh.

The Government now classes a 40-mile haul as a motor truck haul, according to R. E. Chamberlain. truck sales manager Packard Motor Car Co, and shippers who want to aid the Government as well as to improve their own service have enlisted the motor truck as the logical carrier for hauls up to and even beyond this distance.

The Pacific Coast Steel Co. blew in its blast furnace at Irondale, Wash., Sept. 10. The furnace, which was owned and for a time operated by the Western Steel Corporation, was last active in 1910.

Foundrymen's Conventions at Boston

Plans for the Professional Sessions and the Machinery Exhibition — Elaborate Arrangements for Entertainment—New Record for Number of Exhibitors

THE city of Boston, famous for its history and its greatness, past and present, will be the place of the meeting of the American Foundrymen's Association and the American Institute of Metals this year, beginning Monday, Sept. 24, and ending Friday, Sept. 28.

When the foundrymen last met in Boston, 15 years ago, there was an attendance of less than 300. This year there will be probably 3000. Last year, when the conventions were held in Cleveland and there were about 130 exhibitors, with a very large attendance at the professional meetings, a new record was established, but this year space has been assigned to nearly 150 exhibitors. As the reserved floor space is considerably in excess of that occupied in Cleveland, the success of the exhibition is assured, and the outlook is that the attendance at the professional sessions will be larger than it was in Cleveland.

A long and varied list of papers has been prepared by the two associations, and complete arrangements have been made for the holding of the meetings at such times as to accommodate the greatest number in attendance. The plan, which was so successful last year, of having joint management by the two associations of the exhibition of foundry equipment and supplies and of machinery and accessories will be continued this year, as will also the plan of holding one meeting each day so as to allow those attending the conventions to inspect the exhibits, visit plants and participate in entertainment features at their pleasure. Some of the reports of the committees promise to be exceedingly interesting. Special attention will be given to the manufacture of implements of war.

The associations will have a joint opening session in Paul Revere Hall, Mechanics Building, at three o'clock Monday afternoon, Sept. 24, and this will be the only afternoon session. The associations will meet separately Tuesday, Wednesday, Thursday and Friday mornings.

The exhibition will open at 10 a.m. Monday at Mechanics Hall and will close Friday night. Throughout the week, plants of interest will be visited. The Waltham Watch Co., Waltham, Mass., will receive a limited number of visitors. Friday afternoon will be devoted especially to plant visitation and arrangements have been made with a number of foundries and industrial plants in the Boston district for their inspection by the visitors.

With the libraries, art galleries, Harvard University and the magnificent new buildings of the Massachusetts Institute of Technology it will not be difficult for any visitors to pick out places of interest to visit, but a number of entertainment features have been provided. On Tuesday afternoon a steamer will leave for a special harbor trip, including a landing at Nantasket Beach, and luncheon will be served on board. Wednesday afternoon the visiting foundrymen will attend a baseball game between the Boston and Cleveland American League teams at Fenway Park. A vaudeville performance will be enjoyed Wednesday evening at Keith's theater. Thursday afternoon the West Lynn plant of the General Electric Co. will be visited, and in the evening the annual banquet, which has become famous in the past three or four years for its admirable features, will be held at the Copley-Plaza Hotel. Speakers of national reputation will be heard and some unusual entertainment features will be provided.

As was the case last year, the visiting ladies are assured a delightful time. They will take part in the boat ride Tuesday afternoon and be given tickets for the ball game Wednesday afternoon and Keith's theater Wednesday evening. They will also enjoy a luncheon Thursday and the banquet Friday.

Condensed Program of Foundry Week

Monday, Sept. 24

10.00 a. m.—Registration, Mechanics Building. Opening of exhibition.
3.00 p. m.—JOINT OPENING SESSION, American Foundrymen's Association and American Institute of Metals, Paul Revere Hall, Mechanics Building.

Tuesday, Sept. 25

9.30 a. m.—MELTING AND CASTING SESSION, American Institute of Metals, Hotel Somerset.
10.00 a. m.—PROFESSIONAL SESSION, American Foundrymen's Association, Paul Revere Hall.
1.30 p. m.—Boat ride in and about Boston Harbor with a landing at Nantasket Beach.

Wednesday, Sept. 26

9.30 a. m.—NON-FERROUS METALS FOR MUNITIONS, American Institute of Metals, Hotel Somerset.
10.00 a. m.—GENERAL SESSION, American Foundrymen's Association, Paul Revere Hall; and MALLEABLE SESSION, Mechanics' Hall.
3.00 p. m.—Baseball game, Fenway Park, Boston versus Cleveland.
8.15 p. m.—Theater party, Keith's vaudeville house.

Thursday, Sept. 27

9.30 a. m.—TESTING SESSION, American Institute of Metals, Hotel Somerset.
10.00 a. m.—STEEL SESSION, American Foundrymen's Association, Mechanics Building; GRAY IRON SESSION, Paul Revere Hall.
12.00 m.—Luncheon for the ladies, followed by an automobile ride.
12.30 p. m.—Visit to the West Lynn plant of the General Electric Co., luncheon to be served at the plant.
7.00 p. m.—Annual banquet, Copley-Plaza Hotel.

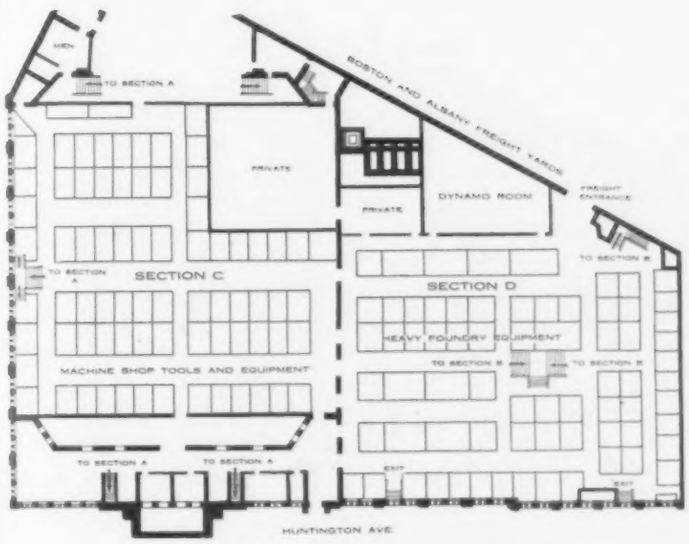
Friday, Sept. 28

9.30 a. m.—METALLURGY AND METALLOGRAPHY, American Institute of Metals, Hotel Somerset.
10.00 a. m.—STEEL SESSION, American Foundrymen's Association, Mechanics Building; GENERAL SESSION, Paul Revere Hall.
Plant visitation.
Exhibition closes at night.

Exhibitors at the Foundry and Machine Exposition

(Letters designate general location on the plans on the facing page)

Abell-Howe Co., 565 West Washington Boulevard, Chicago..B
Ajax Metal Co., Philadelphia....A
Albany Sand & Supply Co., Albany, N. Y....A
American Foundry Equipment Co., Cleveland....B
American Gum Products Co., 200 Fifth Avenue, New York..A
American Lighting Co., 1422 West Randolph Street, Chicago....A
American Molding Machine Co., Terre Haute, Ind....D
American Museum of Safety, New York....A
American Pipe Bending Machine Co., 39 Pearl Street, Boston....B
Arcade Mfg. Co., Freeport, Ill....D
Armstrong Cork & Insulation Co., Pittsburgh....C
Asbury Graphite Mills, Asbury, N. J....A
Athol Machine Co., Athol, Mass....A
Atkins & Co., E. C., Indianapolis....C
Ayer & Lord Tie Co., Railway Exchange Building, Chicago..B
B. & B. Mfg. Co., Indianapolis....D
Beaudry & Co., Inc., 141 Milk Street, Boston....C
Berkshire Mfg. Co., Cleveland....B
Chas. H. Besley & Co., 118 North Clinton Street, Chicago...C
Bilton Machine Tool Co., Bridgeport, Conn....C
S. Birkenstein & Sons, 377 West Ontario Street, Chicago..B
G. S. Blodgett Co., Burlington, Vt....B
Blystone Mfg. Co., Cambridge Springs, Pa....B
Brass World Publishing Co., New York....A
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn....C
Brown Specialty Machinery Co., 2448 West Twenty-second Street, Chicago....D
Buckeye Products Co., 919 Fifth Street, Cincinnati....B
Carborundum Co., Niagara Falls, N. Y....A
Cataract Refining & Mfg. Co., Buffalo....A
Champion Foundry & Machine Co., Chicago....B
Frank D. Chase, Peoples Gas Building, Chicago....B
Chase Turbine Mfg. Co., Orange, Mass....C
Chicago Pneumatic Tool Co., Fisher Building, Chicago....D
Chisholm-Moore Mfg. Co., Cleveland....B
Cincinnati Pulley Machinery Co., Cincinnati....C
Charles J. Clark, 1716 West Adams Street, Chicago....B
Cleveland Blow Pipe & Mfg. Co., Cleveland....D
Cleveland-Osborn Mfg. Co., New York....A
Cleveland Pneumatic Tool Co., Cleveland....D
Thos. E. Coale Lumber Co., Philadelphia....B
Combined Supply & Equipment Co., 766 Grant Street, Buffalo....A
Corn Products Refining Co., New York....B
Curtis Pneumatic Machinery Co., St. Louis....D
Cutter & Wood Supply Co., 70 Pearl Street, Boston....B
Davis-Bournonville Co., Jersey City, N. J....D
Debevoise-Anderson Co., 56 Liberty Street, New York....A
Dings Magnetic Separator Co., Milwaukee, Wis....B
Divine Brothers Co., Utica, N. Y....C
Joseph Dixon Crucible Co., Hancock Building, Boston....A
Stanley Doggett, New York....A
G. Drouve Co., Bridgeport, Conn....B
Eastern Brass & Ingot Corporation, Waterbury, Conn....A
Federal Foundry Supply Co., Cleveland....D
Felt & Tarrant Mfg. Co., Chicago....A
Forbes & Myers, 172 Union Street, Worcester, Mass....C
Foreign Crucibles, Ltd., Hudson Terminal Building, New York....A
Foundry Equipment Co., 1831 Columbus Road, Cleveland..B
Gardner Machine Co., Beloit, Wis....C
General Electric Co., Schenectady, N. Y....C
General Fire Extinguisher Co., Providence, R. I....B
General Platers' Supply Co., New York....A
Goldschmidt Thermit Co., 120 Broadway, New York....A
Great Western Mfg. Co., Leavenworth, Kan....B
Harrison Supply Co., 5 Dorchester Avenue Extension, Boston....A
Hart & Hutchinson Co., New Britain, Conn....A
Hauck Mfg. Co., Brooklyn, N. Y....B
Hayward Co., 50 Church Street, New York....A
Herman Pneumatic Machine Co., Union Bank Building, Pittsburgh....B
Hill, Clarke & Co., 156 Oliver Street, Boston....C
Hoevel Mfg. Corporation, 50 Church Street, New York....D
Herman A. Holz, 1 Madison Avenue, New York....A
International Molding Machine Co., 2614 West Sixteenth Street, Chicago....B
THE IRON AGE, New York....A
Jennison-Wright Co., Toledo, Ohio....A
Spencer Kellogg & Sons, Buffalo....B
T. P. Kelly & Co., Inc., 355 West Twenty-sixth Street, New York....A
Julius King Optical Co., 7 West Madison Street, Chicago....A
Lamson Co., Boston....B
Lees-Bradner Co., Cleveland....C
Lewis-Shepard Co., 48 Binford Street, Boston....A
Ludlum Electric Furnace Corporation, New York....A
David Lupton's Sons Co., Philadelphia....B
Lynd-Farquhar Co., 419 Atlantic Avenue, Boston....C
J. S. McCormick Co., Pittsburgh....B
McCrosky Reamer Co., Meadville, Pa....C
McLain's System, Inc., 808 Goldsmith Building, Milwaukee, Wis....B
Maclean Publishing Co., Toronto, Ont....A
Macleod Co., Cincinnati....B
Mahr Mfg. Co., Minneapolis, Minn....D
Malleable Iron Fittings Co., Branford, Conn....D
Metal Industry, New York....A
Michigan Smelting & Refining Co., Detroit....A
Midland Machine Co., Detroit....D
Moltrup Steel Products Co., Beaver Falls, Pa....B
Monarch Engineering & Mfg. Co., Baltimore, Md....B
Mott Sand Blast Mfg. Co., Brooklyn, N. Y....D
E. H. Mumford Co., Elizabeth, N. J....D
Mumford Molding Machine Co., 1765 Elston Avenue, Chicago....B
National Engineering Co., 505 Tacoma Building, Chicago...D
National Safety Council, Chicago....A
New Chicago Crucible Co., Chicago....A
New England Coal & Coke Co., 111 Devonshire Street, Boston....A
New Haven Sand Blast Co., New Haven, Conn....B
Wm. H. Nicholls Co., Brooklyn, N. Y....D
Norma Co. of America, 1790 Broadway, New York....A
Norton Co., Worcester, Mass....C
S. Obermayer Co., Chicago....B
O. K. Crucible Co., New York....A
Oliver Machinery Co., Grand Rapids, Mich....C
Osborn Mfg. Co., 5401 Hamilton Avenue, Cleveland....D
Oxweld Acetylene Co., 646 Frelinghuysen Avenue, Newark, N. J....C
Pangborn Corporation, Hagerstown, Md....B
J. W. Paxson Co., 1021 Delaware Street, Philadelphia....A
Penton Publishing Co., Cleveland....A
Philadelphia Bourse, Philadelphia....A
Pickands, Brown & Co., Chicago....A
Pittsburgh Crushed Steel Co., Pittsburgh....A
Portage Silica Co., Youngstown, Ohio....B
Henry E. Pridmore, Inc., 1901 South Rockwell Street, Chicago....D
Quigley Furnace Specialties Co., 26 Cortlandt Street, New York....B
Railway Mechanical Engineer, Chicago....C
Richey, Browne & Donald, Inc., Maspeth, N. Y....B
Rivett Lathe & Grinder Co., Brighton, Boston....C
Robeson Process Co., 18 East Forty-first Street, New York..A
Rogers, Brown & Co., Cincinnati....A
Safety First Shoe Co., Providence, R. I....A
Sand Mixing Machine Co., 52 Vanderbilt Avenue, New York....B
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y...B
Simonds Mfg. Co., Fitchburg, Mass....C
W. W. Sly Mfg. Co., Cleveland....B
R. P. Smith & Sons Co., Chicago....A
Werner G. Smith Co., Cleveland....A
Standard Equipment Co., New Haven, Conn....D
Sterling Wheelbarrow Co., West Allis, Wis....A
W. F. Stodder, Syracuse, N. Y....B
Strong, Kennard & Nutt Co., Cleveland....A
Sullivan Machinery Co., Chicago....D
Swan & Finch Co., New York....B
Thomas Iron Co., 50 Congress Street, Boston....A
Titanium Bronze Co., Inc., Niagara Falls, N. Y....B
United Compound Co., 228 Milk Street, Buffalo....A
United Metal Hose Co., 89 Chambers Street, New York....B
U. S. Graphite Co., Saginaw, Mich....B
U. S. Molding Machine Co., Cleveland....D
U. S. Silica Co., 419 Peoples Gas Building, Chicago....B
J. D. Wallace & Co., 1401 West Jackson Boulevard, Chicago..B
Warner & Swasey Co., Cleveland....C
Wentworth Institute, Boston....B
Wheeler & Holcomb Co., 1360 Wells Street, Chicago....A
White & Bro., Richmond and Hedley Streets, Philadelphia..A
Whitehead Brothers Co., Providence, R. I....A
Whiting Foundry Equipment Co., Harvey, Ill....B
E. J. Woodison Co., Detroit....D
T. B. Wood's Sons Co., Chambersburg, Pa....A



Mechanics Building
Boston

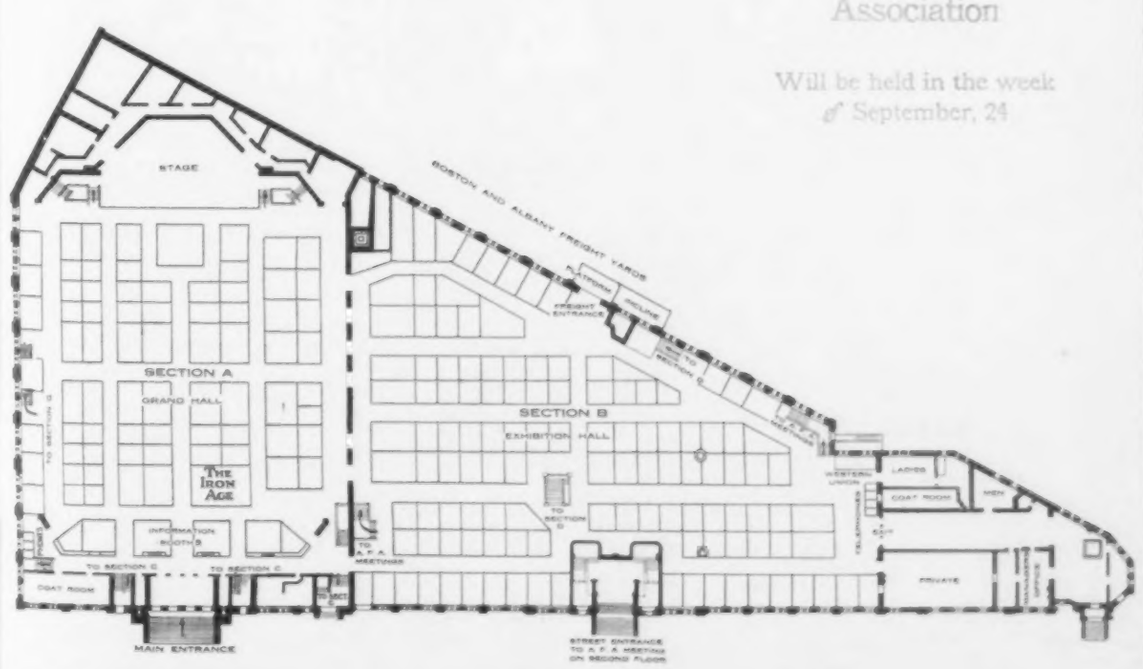
Where the 12th Annual

Foundry & Machine Shop

Exhibition of the

American Foundrymen's Association

Will be held in the week of September, 24



Exhibitors and the Products Displayed

Abell-Howe Co., Chicago.—A display of the Howe detachable tongue truck in various styles of platforms and bodies; also an American electric hoist in operation, and operating models of American high speed chain and Union roller and bushing chain. Represented by Oliver J. Abell, president.

Ajax Metal Co., Philadelphia.—Display of Ajax process ingots and a variety of castings. Exhibit in charge of Frank M. Willeson, New England representative, with G. H. Clamer, first vice-president and secretary; Charles F. Hopkins, superintendent; A. MacDougall, New York representative, and Joseph C. Brightbill, Philadelphia representative, and J. Millson Graham in attendance.

Albany Sand & Supply Co., Albany, N. Y.—Exhibit of a range made in the company's sand by the Walker & Pratt Mfg. Co., Watertown, Mass., and Boston. Represented by Charles H. Bird and Lawrence Murray, president.

American Foundry Equipment Co. and the Sand Mixing Machine Co. (combined), New York.—A display of a new design of sand cutting machine for cutting molders' sand which in addition to cutting it will also pile it alongside the bench or machine for stationary molding; also new "Humane" rotary table sand blast room in operation, and other sand blast equipment. Represented by V. E. Minich, vice-president and general manager; H. L. Wadsworth, Cleveland, factory manager; Hutton H. Haley, Detroit, district manager; John D. Alexander, Cleveland, and Charles G. Smith, Philadelphia, sales representatives.

American Gum Products Co., New York.—Goulac core binder, together with cores and castings. Represented by Gordon I. Lindsay, general manager; W. E. Baird, manager foundry department; R. H. Mills, salesman; F. B. Thomas and M. F. Coughlin.

American Lighting Co., Chicago.—Display of Western Electric-Davis flood lights. Represented by Will J. Davis, Jr., president; F. M. Evans and J. C. Starr.

American Molding Machine Co., Terre Haute, Ind.—A 10-in. jolt-ramming, rock-over molding machine in operation, as well as a jolt-ramming stripping plate machine with a 12-in. draw. Represented by W. C. Norcross and L. J. Cox.

American Pipe Bending Machine Co., Boston.—Display of three models of "Wonder" pipe bending machines. Represented by Marks Angel, James Heggie, John Heggie and Edmond P. Blake.

Arcade Mfg. Co., Freeport, Ill.—Display of 24-in. power rollover jolt and pattern drawing machine, 24-in. modern jolt showing a ferrule plate, piston cope machine, piston drag machine, 38-in. modern jolt, No. 2 modern jolt, No. 90 combined jolt squeezer, 8-in. air squeezer, 3-in. Midget core jolter, 2-X hand squeezer, 17½-in. Norcross jarring machine, and Brillion pouring device. Represented by E. H. Morgan, Charles Morgan, L. L. Munn, R. E. Turnbull, Henry Tscherning, August Christen and G. D. Wolfley.

Armstrong Cork Co., Pittsburgh, Pa.—Display of insulating brick, cork covering for water, brine and ammonia lines, high pressure covering, and corkboard for refrigeration purposes. Represented by A. L. Dorr and E. C. Lloyd.

Athol Machine Co., Athol, Mass.—Display of Athol and Starrett improved vises of all types, mechanics' fine tools and other products of this concern's manufacture. Represented by Stephen E. French, general manager and superintendent, and H. K. Parkman, salesman.

E. C. Atkins & Co., Indianapolis.—An exhibit of metal saws, such as circular, hack blades and frames, hand saws, Kwik Kut metal cutting machines and foundry plates. Represented by T. H. Endicott, W. L. Timpone and T. A. Carroll.

Ayer & Lord Tie Co., Chicago.—A display of A & L interior creosoted wood blocks installed in the floor of the booth. Represented by A. H. Noyes, secretary and treasurer; W. H. Blythe Chicago; B. S. McConnell and F. W. Decker, construction engineers, Cleveland; R. G. Inslee and R. H. Inslee, construction engineers, New York, and H. G. Stephens, construction engineer, Philadelphia.

B. & B. Mfg. Co., Inc., Indianapolis.—Display of portable and stationary power and hand molding machines. Represented by W. Kesler, secretary.

Beaudry & Co., Boston.—Display of 100-lb. Beaudry Champion hammer and a 50-lb. Fairbanks hammer, both in operation. Represented by O. Abrabamsen, treasurer, and Archibald Parsons, treasurer of the United Hammer Co.

Berkshire Mfg. Co., Cleveland.—Display of air and hand squeezer molding machine with special lifting device; iron, wood and aluminum flasks, match plates, vibrators, flask fittings, etc. Represented by R. H. York, president; W. A. Price, treasurer; W. D. Fraser, manager, and G. L. Cannon.

Charles H. Besly & Co., Chicago.—Display of No. 17, 24-in. L Besley wide face ring wheel grinder with 30-in. disk wheel; No. 15. 30-in. B Besley pattern makers' disk grinder; No. 19, 53-in. Besly horizontal disk grinder, and No. 6, 20-in. Besly double-spindle disk grinder. Represented by Edward P. Welles, president; Charles A. Knill, Ralph W. Young, Charles H. Munch and John C. Curns.

Champion Foundry & Machine Co., Chicago.—Exhibit of two Champion electric sand riddles in operation. Represented by T. J. Magnuson and H. O. Magnuson.

S. Birkenstein & Sons, Chicago.—Display of ingot brass, manganese bronze ingot, phosphor bronze ingot, ingot copper, pig tin, pig lead and babbitt metal and other non-ferrous base metals and their alloys, also castings made from these products for the purpose of showing their working qualities.

G. S. Blodgett Co., Burlington, Vt.—Display of small portable ovens used for enameling, japanning and for core baking purposes. Represented by R. L. Patrick, treasurer.

Blystone Mfg. Co., Cambridge Springs, Pa.—Display of 7 cu. ft. Blystone mixer with screen, 3-hp. motor and power discharge attached. Represented by Luther G. Conroe and T. A. Graham.

Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.—Display of No. 7 alternating current motor-driven floor grinders with ball bearings, equipped with improved steel guards, and a No. 1 alternating current swing frame grinder. Represented by D. T. Homan, vice-president, and A. H. Kean, treasurer.

Brown Specialty Machinery Co., Chicago.—Display of No. 1 revolving barrel sandblast machine equipped with cloth screen type dust arrestor and exhaust fan, and Style A hammer core machine, both of which will be in operation, and Style B hammer core machine and an electric duplex shaker. Represented by Elmer A. Rich, Jr.; J. E. Sweet, R. E. Laycock, J. L. Laycock and R. G. Coburn.

Buckeye Products Co, Cincinnati.—Display of metal melting crucible and non-crucible furnaces, air and electric vibrators, parting compound, core compound, patent flask guides and pins, metal fluxes, etc. Represented by C. J. Goehringer, president; D. S. Marfield, treasurer, and the following salesmen: B. Bernbaum, C. Gysin, J B. Carpenter and E. R. Sutton.

Carborundum Co., Niagara Falls, N. Y.—Samples of crude carborundum crystals and crude aloxite. Represented by J. E. Rayner, manager of the Boston store, and John MacArthur, H. E. Hammond, G. E. Dresser and H. H. Miller, of the Boston store; O. C. Dobson, of the Pittsburgh store; H. E. Kerwin, of the Chicago store, and C. E. Hawke, manager service department.

Cataract Refining & Mfg. Co., Buffalo.—Cutting oils and compounds, quenching and tempering oils, core oil and parting. Represented by A. A. Schaefer, F. F. Hennessy, J. A. MacVeagh, M. E. Becker, F. N. Tweedy, J. Purvis, N. C. Back, F. M. Edwards and L. C. Smith.

Frank D. Chase, Chicago.—A display of photographs and colored illustrations of plants designed by the firm as an industrial engineer, and standards developed for the construction of furnaces, ovens, etc.

Chase Turbine Mfg. Co., Orange, Mass.—An exhibit of automatic polishing and buffing machines under power and in actual use, adapted for the polishing and buffing of round, flat or cylindrical parts. Divine Bros. Co., polishing engineer, Utica, N. Y., occupies a part of this space, showing a complete line of wheels, wheel dressers and balancers and polishing tools. Chase Turbine Mfg. Co. represented by W. G. Chapman and Divine Bros. Co. represented by B. H. Divine and F. W. Sturdevant.

Chicago Pneumatic Tool Co., Chicago.—One of its compressors will furnish about one-half of the compressed air used by exhibitors. Pneumatic riveting, chipping, sand ramming, grinding, hoisting, electric drilling and other tools and a new portable electric sand sifter will be displayed. In charge of A. C. Andresen; also F. S. Eggleston, manager Boston office; E. J. Foley and others.

Chisholm-Moore Mfg. Co., Cleveland.—Cyclone hoists and matchless trolleys displayed. Represented by George W. Bateman.

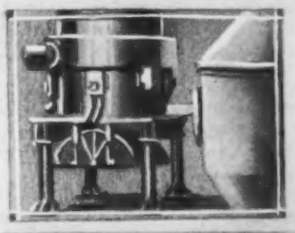
Cincinnati Pulley Machinery Co., Cincinnati.—A display of one three-spindle No. ½ Avey drilling machine equipped with gravity feed for each spindle; and a number of other machines, many of them in operation. Represented by L. B. Patterson, president and treasurer; J. G. Hey, vice-president and general manager; J. F. Merrielees, general superintendent, and C. K. Cairns, sales manager.

Charles J. Clark, Chicago.—Display of blast volume meters and allied instruments. Represented by Charles J. Clark.

Cleveland Blow Pipe & Mfg. Co., Cleveland.—A display of a motor-driven exhaust fan, various designs of hoods for use on buffing, polishing and emery wheels, dust collector and the necessary material required to connect from the emery wheels to the exhaust fan and from the exhaust fan to the dust collector; also a two-section shower bath for foundry and factory use. Represented by Edward Coney.

Chairmen of Committees for Foundry Week

WILLIAM A. VIALL



W. E. FREELAND

Mr. Lavelle, New England Coal & Coke Co., Everett, Mass., is chairman of the executive committee.

Mr. Tutein, Thomas Iron Co., Boston, is chairman of the reception committee.

Mr. Viall, Brown & Sharpe Mfg. Co., Providence, R. I., is chairman of the finance committee.

Mr. Henshaw, pig iron and coke, Boston, is chairman of the golf committee.

Mr. Reed, Reed, Fears & Miller, pig iron and coke, Boston, is chairman of the entertainment committee.

Mr. Freeland, New England editor THE IRON AGE, Worcester, is chairman of the press committee.

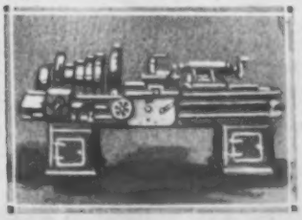
Mr. Walker, Walker & Pratt Mfg. Co., Boston, is chairman of the ladies entertainment committee.

W. J. LAVELLE

E. ARTHUR TUTEIN

CHARLES A. REED

JOHN O. HENSHAW



R. D. WALKER

Cleveland Pneumatic Tool Co., Cleveland.—Riveting, chipping, beading, calking, scaling and bushing hammers; jam riveters, reversible and non-reversible air drills, tapping and wood boring machines, compound and corner drills, bench and center grinders, portable grinders; floor, flask, bench and core rammers, angle gears, pneumatic hold-ons, Bowes air hose couplings and Never-Slip hose clamps. Represented by H. S. Covey, secretary; Arthur Scott, superintendent; G. Gregory, manager New York office; F. E. Schwarze, manager Philadelphia office, and C. D. Garner, manager Toronto office.

Thomas E. Coale Lumber Co., Philadelphia.—Display of samples of Michigan soft cork white pine pattern lumber of various grades. Represented by Thomas E. Coale and Andrew Warren Anderson.

Combined Supply & Equipment Co., Buffalo.—Display of Angle Stem chaplets. Represented by S. LeViness, Jr., and C. L. Jackson.

Curtis Pneumatic Machinery Co., St. Louis.—Display of Curtis vertical double cylinder single-acting compressor, water-cooled with regulatable sight feed splash oiling feature, motor driven unit with automatic pressure control and circulating pump for cooling water; Curtis pendant vertical cylinder air hoist; Curtis horizontal rope compounded cylinder air hoist suspended from single I-beam trolleys; single I-beam hand operated bridge crane with trolley and single I-beam bracket jib crane.

Cutter & Wood Supply Co., Boston.—Display of miscellaneous foundry equipment, especially machines for casting, cleaning, machining, polishing, plating and lacquering. Represented by W. S. Wood, president, and W. H. Mulholland, secretary and treasurer, and the following traveling salesmen: A. E. Carpenter, C. G. Bills, George H. French and A. M. Ham.

Davis-Bournonville Co., Boston.—Exhibit will consist of oxy-acetylene welding and cutting equipment, including acetylene generators, welding and cutting torches, regulators, etc.; No. 2 Oxygraph and Radiagraph in operation. Represented by Stuart Plumley, F. C. Hobbs, George Jaeger, George J. Strobel, George V. K. Greene, Fred A. Blood and A. Blaser of the New England sales and demonstrating force, also W. W. Barnes, district sales manager, Philadelphia, and Hugh F. Dyar, district sales manager, Cleveland.

Debevoise-Anderson Co., New York.—Samples of several brands of coke pig iron, charcoal pig iron, various brands of coke and limestone. Represented by N. Anderson, C. A. Wyatt, W. K. Callow, A. E. Kelly and C. K. Sutton.

Dings Magnetic Separator Co., Milwaukee, Wis.—Display of four types of separators, all power driven, as follows: Type O No. 2, with motor attached; type M No. 3, with motor generator set; magnetic pulley type with motor, and a hand magnet. Represented by Mr. Foblan, sales manager, and Mr. Bethke.

Joseph Dixon Crucible Co., Boston.—Display of Dixon's crucibles, covers, stirrers, stoppers, sand crucibles, scorifiers, cupels, etc. Represented by D. A. Johnson, manager Chicago office; H. A. Nealley, manager Boston office, and the following salesmen: H. C. Sorenson, R. J. Belleville, J. J. Tucker, R. H. Brinkerhoff, C. A. Shaw, E. A. St. John, A. L. Haasis, R. F. Leonard, J. K. Moses, John A. Condit, A. G. Quimby and M. McNaughton.

G. Drouve Co., Bridgeport, Conn.—Models of Anti-Pluvius puttyless skylights and Straight-Push sash operators. Represented by William V. Dee, secretary.

Eastern Brass & Ingot Corporation, Waterbury, Conn.—A display of samples of briquet-ingots formed by pressure from fine metal scrap; also charts showing the savings effected by the use of briquet-ingots. Represented by Howard Baker, F. A. Purdy, G. G. Hanson and W. S. Lord.

Federal Foundry Supply Co., Cleveland.—Display of eight power squeezers and combination jolt and squeeze machines of various sizes; jolt machines for making cores and molds; core ovens, electric vibrators and knee valves, flasks, etc. Represented by W. J. Adams, Ralph Ditty, Ellsworth Kaye, John Bayer, W. J. Smith, I. D. Adams and T. R. Ditty.

Felt & Tarrant Mfg. Co., Chicago.—Demonstration of the Comptometer adding and calculating machine. Represented by William F. Sims, J. G. Luniak and W. G. Resch.

Forbes & Myers, Worcester, Mass.—Display of Models 56, 156X and 110 motor grinders of this firm's manufacture.

Foreign Crucibles, Ltd., New York.—A display of European crucibles. Represented by George H. Ames.

Foundry Equipment Co., Cleveland.—Display of various types of Coleman core ovens, metal melting furnaces, oil burners, crucible lifters, squeezers, etc. A feature of the exhibit is a combination battery of one Coleman roller drawer oven and a portable rack type of oven. In the latter type of oven a transveyor is used to move the loaded racks of cores into and out of the oven. Represented by F. A. Coleman and C. A. Barnett.

Gardner Machine Co., Beloit, Wis.—Display of five types of belt and motor driven polishing lathes and ten types and sizes of Gardner grinders, and an assortment of supplies and accessories. Exhibit includes two recent additions to the Gardner line, the No. 15 double spindle grinder, which is of 20-in. ring wheel capacity, and a new No. 24 vertical spindle 53-in. disk grinder. Represented by W. B. Leishman, treasurer; W. L. Townsend, demonstrator; A. A. Swinnerton, Springfield, Mass., sales representative; F. M. Risler, New York sales representative, and also by representatives from Boston agents, the Lynd-Farquhar Co., and from the New York agents the Vandyck-Churchill Co.

General Electric Co., Schenectady, N. Y.—Display of centrifugal air compressors for cupola service, electric core baking ovens, etc. J. M. Hollister, representing the general office at Schenectady, and M. R. Griffeth, of the Boston office. Other representatives are A. R. Bush, J. W. Ham and B. L. Spain of the Schenectady general office; J. F. Steele, C. B. Davis and D. G. Brokaw of the Boston office; P. A. Dyer, New York office, and W. C. Fish, manager of the Lynn works

General Fire Extinguisher Co., Providence, R. I.—Display consists of an installation of an automatic sprinkler complete with wire glass house for demonstrating operation of sprinkler, together with ADT supervisory system. Represented by W. A. Kennedy, mechanical engineer; A. J. Richmond, Boston manager; R. A. Jenckes, department agent; J. D. Pryor, department of publicity and promotion; George S. Barrows, manager of gas heating, and Carl Hausler Hale, gas mixer.

Goldschmidt Thermit Co., New York.—Complete line of samples of the various metals and alloys which this concern manufactures, such as manganese, chromium, cobalt, tungsten, ferrotungsten, ferrochromium, manganese copper, ferromolybdenum, ferrotitanium, etc. W. R. Hulbert, sales manager; A. F. Braid, metallurgical engineer; H. G. Spilsbury, metallurgical engineer; H. D. Kelley and J. G. McCarty.

Great Western Mfg. Co., Leavenworth, Kan.—Type V, type CR, type CS and type HS gyratory foundry riddles. Represented by George W. Combs, superintendent, and F. A. Pickett.

Harrison Supply Co., Boston.—Metallic sand blast materials, including the company's principal products, chilled shot and Diamond grit.

Hauck Mfg. Co., Brooklyn, N. Y.—Hauck cupola lighters, mold dryers, ladle heaters, melting furnaces and kerosene torches. Represented by A. E. Hauck, president; Busch Hauck, vice-president, and A. P. Link.

Hayward Co., New York.—Display of photographs showing its Hayward buckets in operation on various classes of work. Represented by H. M. Davison and C. F. Hutchings.

Herman Pneumatic Machine Co., Pittsburgh.—Display of plain jarring machine of 4-ton capacity and a smaller plain jarring machine; also a new type of combination jar and squeeze machine Represented by Thomas Kaveny, A. M. Frauenheim, H. T. Frauenheim, Alfred Herman, Robert F. Ringle, I. J. Oesterling, R. P. Morgan, Walter Hughes, A. McWithey, Robert Porteous and Harry W. Gahan.

Hill, Clarke & Co., Boston.—This display shows the following new machines: Henry & Wright drilling machines, Fraser grinders, Superior drilling machines, Millholland screw machines, Jarecki pipe machines, Flather lathes, Roulsted lathe, Boye & Emmes lathe, Greenfield cutter grinder, Consolidated press, Carlton radial drilling machine, Atlas arbor press and Wilmarth & Morman universal grinder.

Herman A. Holz, New York.—Display of the Brinell meter, a portable apparatus for the accurate determination of the hardness of metals and metal products, and the Erichsen machine for testing metal sheets, strips, wires, tubes, etc. Represented by Herman A. Holz and W. O. Little.

Hoevel Mfg. Corporation, New York—Revolving barrel sand blast machine and rotary table sand blast machine. Represented by H. F. Hoevel, president; F. W. Weiss, vice-president; L. B. Passmore, Western representative, and G. H. Seltzer, salesman.

International Molding Machine Co., Chicago.—Jarring machines, electric and air; power squeezers, combination stripping squeezers, combination jolt squeezers, hand turn-over draw, etc. Represented by Edward A. Pridmore, president; W. W. Miller, vice-president; F. W. Hamel and J. L. Lanigan.

Jennison-Wright Co., Toledo, Ohio.—Display of Kreolite wood blocks used for factory flooring. Represented by F. E. Jennison, Frank B. Goodman, George L. Dresser, L. P. Drinker and Henry P. Consaul.

Spencer Kellogg & Sons, Inc., Buffalo.—Display of liquid core compounds. Represented by Alfred P. Mason, William L. Goetz and Robert C. Boggess.

T. P. Kelly & Co., Inc., New York.—Booth arranged as a rest room. Represented by H. F. Maurel, V. J. Rohe, B. H. Forman and W. F. Kaine

Julius King Optical Co, Chicago.—Display of approved safety goggles, helmets, masks, etc. Represented by W. G. King.

ice-president; F. W. King, of New York office, and J. J. Duffy and A. G. Larson of Chicago office.

Lamson Co., Boston.—Display includes a special installation of Lamson gravity roller conveyors adapted for use in carrying molds, cores, pig iron, castings, etc., and a working demonstration of Lamson pneumatic tubes.

Lees-Bradner Co., Cleveland.—Display of No. 6 standard thread millers and No. 5-A 19-in. universal gear generators equipped with motor drive and in operation. Represented by E. A. Bayton.

Lewis-Shepard Co., Boston.—Display of Jacklift Master trucks. Represented by A. L. Lewis, president; F. J. Shepard, Jr., treasurer, and J. W. Adams and E. E. Wallace.

Ludlum Electric Furnace Corporation.—See Thornton W. Price.

David Lupton's Sons Co., Philadelphia.—Display featuring the Pond truss roof formation which is extensively used in foundries, and samples of Lupton products, such as Pond continuous sash, Pond operating device, Lupton steel sash of various types, etc. Represented by Clarke P. Pond, sales manager; H. R. Wilkinson, district manager, and C. F. P. Buckwalter, assistant sales manager.

Lynd-Farquhar Co., Boston.—Display of the Lynd-Farquhar 26-in. open side crank planer and shaper; also the American 14-in. tool room lathe; sensitive radial drill; the Lees-Bradner No. 6 thread milling machine and the Lees-Bradner gear hobbing machine. All of these machines are in operation. Represented by H. L. Rich and John S. Alcorn.

J. S. McCormick Co., Pittsburgh.—A general line of foundry supplies. Represented by J. S. McCormick, president; T. E. Malone, secretary and treasurer; S. R. Costley and A. T. Richardson, salesmen.

McCrosky Reamer Co., Meadville, Pa.—A complete line of various styles of adjustable reamers, turret tool posts for lathes, universal lamp brackets, and a demonstration of the Wizard quick-change chucks and collets, and tapping and stud setting devices for a drill press. Represented by C. M. Sutton, assistant sales manager, and Clyde Derby.

McLain's System, Inc., Milwaukee, Wis.—Samples of semi-steel castings of light section such as automobile cylinders and pistons, and other castings containing from 20 to 50 per cent steel; also projectiles of various weights and sizes made by McLain graduates, open-hearth steel castings poured from metal made in a McLain-Carter oil-fired furnace. Represented by David McLain, I. V. Scanlan and Carl Huebl.

Mahr Mfg. Co., Minneapolis, Minn.—Display of foundry torches for cupola lighting, mold drying, pre-heating, etc.; also melting furnaces, rivet furnaces and forging furnaces. Represented by J. A. Mueller, J. R. Matthews, R. B. Ecker and H. H. Warner.

Malleable Iron Fittings Co., Branford, Conn. A full line of all-steel hardened and ground vibrators from ⅜ in. up to and including 2 in.; also a full line of accessories for vibrators. Represented by George D. Pickop, assistant superintendent, and J. C. Page, head of the pattern department.

Michigan Smelting & Refining Co., Detroit.—Exhibit of Detroit standard ingot brass, Sillman's Apex bronze, brass and copper ingot metals, tin, lead products, including lead pipe and solders, babbitt metals, type metals, etc. Represented by Joseph Sillman, president; Henry Levitt, secretary; W. J. Schweitzer, J. T. Tiernan and H. E. Berliner of the sales department; R. R. Arnold, R. E. Moore and I. W. Rollins of the white metal department, and R. H. Evans of the advertising department.

Midland Machine Co., Detroit.—Display of a small hand-rammed rollover machine, small size jar-rammed rollover machine and a special core machine to go on a core bench for making small cores. Represented by G. L. Grimes, manager, and L. V. Grimes, C. R. Jones and Oswald Carliss, salesmen.

Moltrup Steel Products Co., Beaver Falls, Pa.—Display of Moltrup's flattened steel foundry pattern plates, steel engraving plates, cold drawn steel bars, finished machine keys, finished machine rack. Represented by F. H. Guppy and N. S. Leyda.

Monarch Engineering & Mfg. Co., Baltimore, Md.—Display of a complete line of Monarch industrial furnaces for the melting of metals, heat treatment of metals, forging, etc., and a complete line of oil, gas, coal and coke crucible furnaces, tilting and stationary; also a complete line of core ovens for all fuels, shop and tool tempering and heating furnaces. Represented by James J. Allen, M. W. Woodburn, H. D. Harvey, Frank Maujean and William Raber.

Mott Sand Blast Mfg. Co., Inc., Brooklyn.—Working exhibit showing the operation of its sand blast barrel; also a sanitary sand blast cabinet in operation. Represented by E. J. Rosenthal, F. J. Hull and E. C. Gilmour of the New York branch, and David Mayer and C. B. Schneible of the Chicago branch.

Mumford, E. H., Co., Elizabeth, N. J.—Samples of molding machines. Represented by T. J. Mumford, H. W. Sinclair and J. A. Walsh.

Mumford Molding Machine Co., Chicago.—Drawings and possibly a molding machine. Represented by Donald Alexander, assistant sales manager; Otto F. Weiss, salesman; James T. Lee, sales manager, and W. H. Huelster.

National Engineering Co., Chicago.—Display of No. 2 Simpson intensive foundry mixer in operation. Represented by H. S. Simpson, manager.

New England Coal & Coke Co., Boston.—A display of New England foundry coke produced at the Everett Works of the New England Fuel & Transportation Co., made into a model of the Bunker Hill monument rising into the air about 50 ft. Represented by W. J. Lavelle, F. C. Knight, J. M. Dunbar and J. M. Taylor.

New Haven Sand-Blast Co., New Haven, Conn.—Display of Model A sand blast rolling barrel, hose type sand blast machine, sand blast accessories, etc. Represented by Charles A. Dreisbach, president; C. S. Johnson and C. E. Billings.

William H. Nicholls Co., Brooklyn, N. Y.—Plain power squeezer, combination jolt and power squeezers with split pattern drawing, drawing, stripping plate and rollover devices. Represented by William H. Nicholls.

Norma Co. of America, New York.—Norma ball and roller bearings in a variety of sizes. Represented by E. A. Perkins, sales engineer.

Norton Co., Worcester, Mass.—Four grinding machines in operation, with the types of protection hoods furnished with these machines; also a display of grinding wheels used in foundry work. Represented by George C. Montague, W. G. Snow, Herbert Duckworth and Wallace T. Montague.

S. Obermayer Co., Chicago.—Display of brass furnaces, core ovens, snap flasks, sprue cutters, tumbling barrels, chaplets, etc. Represented by S. T. Johnston, E. D. Frohman, William Fenton, William Fitzpatrick, Sr., William Fitzpatrick, Jr., J. J. McDevitt, O. J. Peterson, A. N. Wallin and George Deyette.

Oliver Machinery Co., Grand Rapids, Mich.—Display of Oliver 16-in. tool room engine lathe in operation. Represented by J. W. Oliver, A. Blake, G. W. Crosley, A. S. Kurkjian and J. R. Duthie.

Osborn Mfg. Co., Cleveland.—Display of hand and power operated machines covering direct draw roll over jolt machines, plain air squeezer machines, combination jolt squeezer machines, "Little Wonder" roll over machines, drop plate and stripping plate machines, combination jolt stripper squeezer machines. Represented by H. R. Atwater, vice-president; J. C. Alberts, E. H. Byerlein and E. W. Jacobi, sales engineers.

Oxweld Acetylene Co., Newark, N. J.—Oxweld low pressure type acetylene generating unit in operation, and welding and cutting blow pipes in representative applications. Represented by L. E. Ogden, R. D. MacMillen, J. N. Walker, F. R. Chadwick, G. M. Kerr, C. C. Pilsbury, A. H. Koeller, Jr., and Harold DuBois.

Pangborn Corporation, Hagerstown, Md.—Photographs of sand blast and allied equipment. Represented by John C. Pangborn, W. C. Lytle, P. J. Potter, Alfred L. Holmes, George A. Cooley and Charles M. Goldman.

J. W. Paxson Co, Philadelphia.—Display of complete line of foundry equipment and supplies, sand blast machinery, sands, facings, etc. This display includes moving pictures. Represented by H. M. Bougher, president; W. S. Thomas and R. H. Rehm, New England representatives; E. M. Taggart, New York representative; A. G. Warren, general superintendent, and I. F. Kremer, mechanical engineer.

Pickands, Brown & Co., Chicago.—Display of samples of Solvay coke arranged in the form of a hub. Represented by George A. T. Long, Thomas W. Glasscot, Bayard T. Bacon and James A. Galligan; also James A. Ballard and William H. Ball of the Semet-Solvay Co., Detroit and Syracuse.

Pittsburgh Crushed Steel Co., Pittsburgh.—Complete line of samples of "Angular Grit," a metallic sand blast abrasive. Represented by G. H. Kann.

Portage Silica Co., Youngstown, Ohio.—Samples of silica sand, gravel and sand blast sand and the original rock from which these materials are obtained. Represented by E. E. Klooz, vice-president and general manager, and L. R. Farrell, secretary.

Thornton W. Price, New York.—Display of a working model of the Ludlum electric furnace, together with samples of various grades of cast iron, pig iron, washed metal and cast steel, also various grades of tool and alloy steels which are the product of the Ludlum Steel Co. Also charts showing analyses and results of tests now being made by the General Electric Co. regarding the cost of producing cast iron, pig iron, etc., in an electric furnace, and also tests of the strength of the cast iron and cast steel, which have been made by Columbia University.

Henry E. Pridmore, Chicago.—Display of electric jarring machines, plain hand rock-over drop machine, plain air-power rock-over hand draw machine, hand stripping plate

machine and air-power squeezer machine. Represented by Mrs. Henry E. Pridmore, president and treasurer; Henry A. Pridmore, vice-president and secretary; D. F. Eagan, C. H. Ellis, A. V. Magnuson, and J. W. Dopp of J. W. Dopp & Co., Detroit.

Quigley Furnace Specialties Co., New York.—A display of the Hytempite furnace cement with a practical demonstration of this product in two small high temperature electric furnaces equipped with pyrometers; also a showing of rammed-up lining for pit type melting furnaces and ladles.

Richey, Browne & Donald, Maspeth, N. Y.—Exhibit of a small working model illustrating the company's roller-ramming and molding machines and sand handling appliance, together with samples showing a wide variety of work which can be manufactured by this equipment. Represented by Walter H. Hofmann, J. C. Burdick and J. B. Donohue.

Rivett Lathe & Grinder Co., Boston.—Display of No. 103 internal straight hole and angle grinder, No. 106 internal straight hole and angle grinder, No. 608 back-geared precision lathe mounted on special cabinet with individual motor drive and supplied with a number of this company's attachments, No. 208 automatic radial grinder and an improved Rivett thread tool. Represented by Cecil Ogden, A. O. Richter, Fred Lord and F. H. Halstead.

Robeson Process Co., New York.—Samples of glutrin and cores made with this material; also photographs of cores and castings in which glutrin was used. Represented by T. J. Ryan, R. S. Hughes and George N. Moore.

Rogers, Brown & Co., Cincinnati.—A large display of samples of pig iron, display of beehive and by-product oven metallurgical coke and an asortment of ferroalloys; also gray iron, semi-steel and malleable iron castings of various types. Represented by George R. Sullivan and Richard Peters, Jr., Philadelphia office; A. A. Fowler, R. W. Clark, Otto Arlt and J. A. Claussen, New York office; Sterling W. Hubbard, Cleveland office; Thomas E. Wilson, Pittsburgh office; W. T. Shepard, F. J. Waldo and A. T. Stengel, Buffalo office; J. C. Mears, St. Louis office; H. W. Fernald, F. E. Fitts, W. R. Maher and E. F. Bowden, Boston office; E. L. Billingslea, Chicago office, and F. W. Miller and F. W. Bauer, Cincinnati office.

Sand Mixing Machine Co.—See American Foundry Equipment Co.

Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.—A display of standard Shepard hoists, including a foundry hoist, with variable speed control; also Shepard new light capacity hoist which is designed to take care of loads that are just too heavy for one man and other hoisting devices. Represented by F. A. Hatch, general manager; R. H. McGredy, sales manager; A. J. Barnes, advertising manager, Montour Falls, N. Y.; W. A. Battey, Eastern sales manager and W. C. Briggs, sales engineer, New York office; and Norman Farrar, district manager, and Herbert W. Gledhill, sales engineer, of Philadelphia. Cutter & Wood Co., Boston agents for the Shepard company in that territory also will have its representatives and attendants at this exhibit.

Simonds Mfg. Co., Fitchburg, Mass.—Exhibit includes hack saw blades, files, metal cutting circular saws and metal slitting saws. An inserted tooth metal cutting saw will be in operation on a machine. Represented by H. B. McDonald, Charles E. Woods and H. D. Horton.

W. W. Sly Mfg. Co., Cleveland.—Display of two-section drawer type core oven, 10 x 10 ft. steel sand blast room, No. 5 "Baby" sand blast mill in operation and a resin mill, continuous feed. Represented by W. C. Sly, president; George J. Fanner, vice-president; P. W. Graue, Western representative, and H. P. Furlong, Eastern representative.

R. P. Smith & Sons Co., Chicago.—Display of "Protec-toe" safety shoes for molders and foundrymen. Represented by J. B. Smith, Jr.

Werner G. Smith Co., Cleveland.—Display of Linoil and other core oils, specimen cores made with Linoil, and castings; also a line of plumbago and firebrick. Represented by W. G. Smith, president and general manager; F. H. Dodge, manager of foundry supply department; L. F. Ferster, advertising manager; W. S. Rayel, service expert; A. L. Fay, Western manager; M. S. Finley, Eastern manager, and L. P. Robinson, New England manager.

Standard Equipment Co., New Haven, Conn.—Display of No. 5 cinder mills in operation. Represented by C. A. Dreisbach and L. Bradley.

Strong-Kennard & Nutt Co., Cleveland.—Display of safety devices, including first aid cabinets, hospital equipment, safety cans, fire extinguishers; rubber, leather and asbestos gloves, leggings and clothing; dust hoods, safety signs, respirators and masks, and numerous other devices.

Sterling Wheelbarrow Co., West Allis, Wis.—Wheelbarrows, flask pins, special rolled steel flasks, snap flasks and shop boxes. Represented by E. W. Dowd, New England representative; George H. Lambkin, New York representative; Charles L. Kirk, Pittsburgh representative; J. W. Dopp, Detroit representative, and the following factory representatives: I. R. Smith, president and general manager; H. H. Baker, secretary and sales manager; J. J. Coyne, Chicago manager, and J. M. Dickson, salesman.

Sullivan Machinery Co., Chicago.—The main feature will be a 14 x 8¾ x 10-in. class WJ-3 angle compound compressor equipped with Sullivan plate valves throughout; also air lift boosters for securing water supply from wells. Represented by G. E. Wolcott, sales manager for New England; H. C. O'Brien and G. H. Richey, sales engineers, and Alexander Milne, operating engineer in charge of the exhibit.

Thomas Iron Co., Boston.—Pig iron. Represented by William A. Barrows, Jr., president; Elbridge E. Walker, general sales agent; E. Arthur Tutein, New England representative, and Philip E. Wright, Philadelphia and New York representative.

Titanium Alloy Mfg. Co. and the Titanium Bronze Co., Niagara Falls, N. Y.—A display of castings, including bronze die castings. Represented by W. M. Corse, manager Titanium Bronze Co.; H. R. Corse, sales manager Titanium Bronze Co.; John McCallum, foundry superintendent Titanium Bronze Co.; A. C. Olfs and William Evans of the sales department of the Titanium Alloy Mfg. Co. and the Titanium Bronze Co., and George F. Comstock, metallurgist of the Titanium Alloy Mfg. Co.

United Compound Co., Buffalo.—Display of Buffalo brand vent wax and Buffalo brand pattern wax. Represented by John W. Bradley and L. F. Leney.

United States Graphite Co., Saginaw, Mich.—Exhibit space used for a rest room and for the display of samples of graphite ore and brushes for motors and generators.

U. S. Molding Machine Co., Cleveland.—Display of plain air squeezer, jar and squeeze machine, jar squeeze pattern draw machine, plain air jar machine, jar and pattern draw machine and jar roll-over pattern draw machine. Represented by J. N. Battenfeld, J. L. Battenfeld, C. F. Battenfeld and J. F. Jerka.

United States Silica Co., Chicago.—Display of samples of flint shot. Represented by A. Volney Foster, Lewis B. Reed, Harry F. Goebig and Oliver Cook.

United Metal Hose Co., New York.—Exhibit of flexible metal hose and tubing, including armored, lined, lined welding and lined air hose, also pneumatic tool hose for chipping hammers, etc., metal armored sand blast hose, hose for steam and oil. Represented by Joseph M. Lewin.

J. D. Wallace & Co., Chicago.—Display of a Wallace bench planer driven by a direct connected motor and fitted with a flap and shutter safety guard. Represented by J. D. Wallace, president.

Warner & Swasey Co., Cleveland.—Display of No. 2A universal hollow hexagon turret lathe working on chucking work, No. 4 universal turret screw machine working on bar work, and No. 2 plain head, bar feed, screw machine working on bar work. Represented by H. L. Kinsley, Boston manager, and A. C. Cook, sales manager.

Wheeler & Holcomb Co., Chicago.—Display of a full line of safety wearing apparel. Represented by F. H. Wheeler and Charles A. Kingsbury.

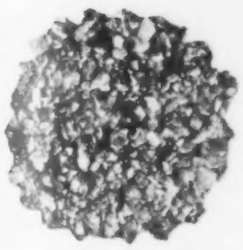
White & Brother, Philadelphia.—A display of ingot metals, white metals, the WB and CC brand of copper and castings made from these various classes of ingot metals. Represented by Clarence B. White, president; John T. Fegley, purchasing agent; Frank Krug, sales manager; Raymond Hunter, Eastern representative; William J. Crighton Canadian and Western representative; C. G. Dickinson manager New York office; Theodore Gruenbaum, special representative, and Raymond Galbraith, white metal representative.

Whitehead Brothers Co., Providence.—No products exhibited. Represented by A. J. Miller, treasurer; Charles E. Andrews, Eastern sales manager; J. H. Whitehead, purchasing agent, and Van Loan Whitehead, Jr., Western sales manager.

Whiting Foundry Equipment Co., Harvey, Ill.—Display of teapot spout ladle, type "R" electric crane trolley, latest improved design, having all gearing inclosed and operating in oil bath, and type "A" round plate tumbling barrel; also photographs showing complete line of cranes and foundry equipment. Represented by R. H. Bourne, R. E. Prussing, A. H. McDougall and C. A. Hardy.

T. B. Wood's Sons Co., Chambersburg, Pa.—Display of the Wood system of taper snap molding, comprising the Peerless patented tapered snap flask and automatic adjustable patented snap jacket. Represented by Charles M. Wood, George M. Naylor and Victor Lesher.

E. J. Woodison Co., Detroit.—Foundry equipment and supplies, including electrically operated jolt-ramming rollover molding machine, air squeezer molding machine, electric vibrator in operation, wood grinder, core oils, buffing compositions, etc. Represented by E. J. Woodison, D. H. Woodison, G. A. Burman, U. W. Frink, W. J. Wark, W. M. Maybank, W. Renchle, D. D. Baxter, H. T. Taylor, C. G. Howe, G. Brady and C. J. Skeffington.

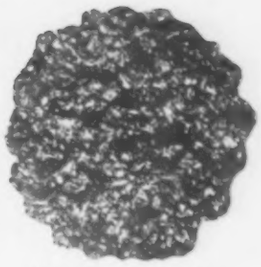


Sand Before Using

Sand-Blast Operation

Quantity and Character of Work Governs Selection of Equipment—Several Methods Briefly Described

BY DAVID EVANS*



After One Day's Use

AS everyone connected with the foundry industry knows, sand blasting is a method of applying sand under air pressure to rough castings to remove the dirt and scale as they come from the foundry.

Very little is known of the early history of the sand-blast, but there is a record of an exhibit of sand-blast equipment at the American Institute Fair, held in New York in 1871. The principle employed at that time is still used in the small sand-blast hose machine, which was the only type in use up to 1900. It seems likely that the use of sand under pressure to clean castings was borrowed from the glass industry, where sand has long been used for producing various effects in ground glass. At that time the use of compressed air was not generally known. Mr. Westinghouse was just introducing it for air-brakes on the railroads and there was no such thing as an air compressor of any great capacity on the market.

Some of the earlier attempts to use sand as a cleaning agent called for the employment of live steam in place of air. This method was said to be effective for cleaning certain kinds of castings for plating, but it made a very dirty and disagreeable job and was abandoned after a short time. This attempt to use live steam is interesting because in modern practice nothing causes so much trouble in the operation of the sand-blast as moisture. Regardless of the method or the type of machine used, or the grade of sand, care must be taken that the sand is "bone-dry" when it is charged into the machine and that no moisture created by the condensation of the air in the pipe line be permitted to come into contact with the sand, as it will choke up the machine, or at best will cause a pulsating effect instead of a steady, even flow.

Cleaning Steel Requires High Pressure

Sand-blasting should be, and usually is, the first work done on a rough casting preparatory to chipping and grinding. The sand-blast operation, therefore, should be done at a point on the line of route between the molding floor and the cleaning room.

For cleaning non-ferrous metals and for malleable and cast iron, a lower air pressure and a finer grade of sand may be used than for steel. Steel castings are difficult to clean. The metal is poured at a high temperature, and the molding sand burns in so that the only effective method of cleaning is by a sand-blast using air at a pressure of about 80 lb. High pressure, although costing more to produce, is invariably recommended for steel castings and, reckoned by the saving in time and the increase in work accomplished, is really cheaper in the long run. It has been estimated by some engineers that it costs about 15 per cent more to deliver air to the machine at 80 lb. than at 35 to 40 lb., but that the air at 80-lb. pressure strikes a 44 per cent harder blow, resulting in a saving of time, and consequently an increase of work of about the same per cent, leaving a net saving in favor of the higher pressure machine of 25 per cent. There is a further benefit in using higher pressure in that it requires a smaller volume of sand, and consequently creates a smaller volume of dust, which must be handled and eliminated, so that the saving in the use of the sand itself and the less amount of dust to be handled are both proper credits in favor of the high pressure.

Four Familiar Types of Equipment

There are several different methods of sand-blasting, and a different type of equipment for each method as follows:

Sand-blast hose machine
Sand-blast table
Sand-blast tumbling mill
Sand-blast room

The sand-blast room uses the same principle as the sand-blast hose machine, but is adapted for handling work on a much larger scale.

In considering the installation of a system for any particular plant, special attention must be given to the quantity and character of the work turned out in order to select the equipment best adapted. A steel foundry turning out as small a quantity as 3 tons per day needs a sand-blast just as much as a plant turning out ten times that amount, and for small plants where the volume of work does not justify a heavy outlay for equipment, the sand-blast hose machine is very satisfactory. This type of machine, Figs. 1 and 2, is common, and most foundrymen are so familiar with it that a detailed description is hardly necessary. Because of its flexibility, i. e., the capability of being used on any class of work, it is still a favorite in its modern form where the work is of a miscellaneous character. The part which receives the greatest wear and which requires the most frequent replacement is the nozzle.

Our first experience in sand-blasting was with a machine of this type, and we were able to effect a great saving in the cost of nozzles by designing a single piece to take the place of the three-piece nozzle furnished by the manufacturer. This single-piece nozzle is cast of hard manganese steel with flat threads on the neck to fit the inside surface of the hose. The hole is tapered, the end within the hose being but a thin shell to offer as little resistance as possible to the sand. About twenty are cast on one gate, and they are broken off by the workman as he needs them. The action of the sand very soon increases the diameter of the hole to such an extent that it will consume twice the amount of air that it is intended to use. These nozzles require changing once or twice a day, and the changes are made by the operator within a very short time. This is a very important point, as the plant may provide 100 cu. ft. of air for a small sand-blast hose machine and find that it uses 200 cu. ft. because of a worn-out nozzle.

The sand-blast table, Fig. 4, consists of a circular, grated disk revolving in a horizontal position.

*President and treasurer Chicago Steel Foundry Co., Chicago.

Compressed air, preferably at 80 lb. or more pressure, carries the abrasive and discharges it through one or more nozzles upon the work resting on the

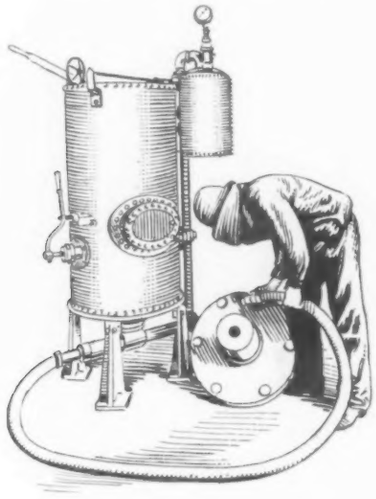


Fig. 1—Sand Blast Hose Machine

disk. When one side of the work is cleaned, the casting is turned over so that it can be blasted on the opposite side. The nozzles are placed to discharge the abrasive at an angle from the perpen-

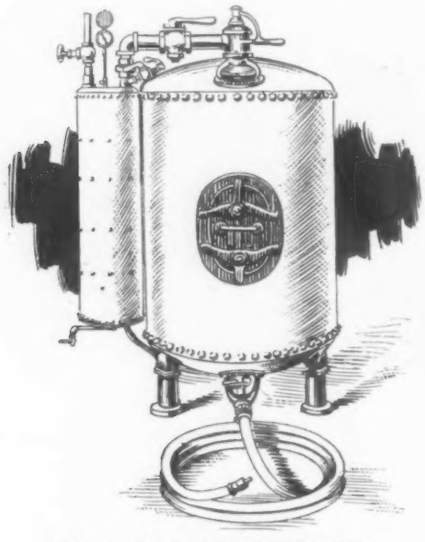


Fig. 2—Sand Blast Hose Machine

dicular so that the sides and top of the casting are cleaned at the same time. This type of equipment is especially adapted for cleaning flat work, but is by no means limited to any particular kind of casting as it compares with the sand-blast tumbling mill in the variety of work it will handle.

The sand-blast tumbling mill is entirely automatic in its action and is especially adapted to handle small or medium parts of more or less irregular design. There are at least two types of this mill on the market; one of them horizontal and one tilted, Figs. 5 and 6. The object of having the barrel tilted is to impart a dual motion to the castings as the barrel revolves, so that every part will come into contact with the stream of sand, which enters through suitable nozzles located in the stationary head and, together with the dust and dirt from the castings, is exhausted through the lower end. The same theory is used in the horizontal mill by having false heads located inside of the stationary heads which give a lateral as well as a horizontal motion to the castings.

This equipment is adapted to jobbing steel foundries with a wide range of work and should be used in conjunction with the hose machine, or with the sand-blast room; the latter equipment to handle the larger pieces and the sand-blast tumbling mill to handle the small and medium-sized castings. It is estimated that a 50 x 40-in. mill will clean about 1500 lb. of small castings, on the gates, within twenty to thirty minutes, using No. 3 sand and air at 80 lb. pressure. The amount it is possible to charge into the barrel varies considerably with the class of castings. Pieces weighing 1 to 3 or 4 lb. take up more room than castings 8 to 10 lb., and our judgment is that if a machine will hold 1500 lb. of the latter it will not hold to exceed 1000 lb. of the former.

The dust from these mills is exhausted by a fan of the proper size and the clean sand elevated to the bin above the mill, either by exhaust or by a bucket elevator system. The hoisting of the sand by air exhaust is preferable to an elevator whose working parts would be rapidly worn out by the action of the sand and would require frequent replacing.

The best method of cleaning large castings in-

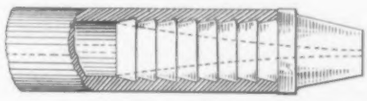


Fig. 3—One-Piece Nozzle of Manganese Steel Fitting Into End of Hose

volves the use of the sand-blast room, Fig. 7. The room should be fitted with a grated floor having a hopper bottom beneath it to catch the sand and dust as they fall from the casting. The bottom of the hopper enters a pipe through which an exhaust system raises both the dust and the sand to the dust separator located at the top of the room and above the sand bin. The dust arrester consists of wood frames covered with a special grade of cotton duck. The dust passes through the screens leaving the clean sand to be returned to the sand bin and the clean air to the sand-blast room. The sand may be used directly from the bin by a hose or it may be returned to a hose sand-blast machine located within the room. The latter method is very satisfactory for jobbing steel foundry work as it enables the operator to stop or start at will, to control the hose with one hand and manipulate the castings with the other.

The sand-blast room may be built of brick, in

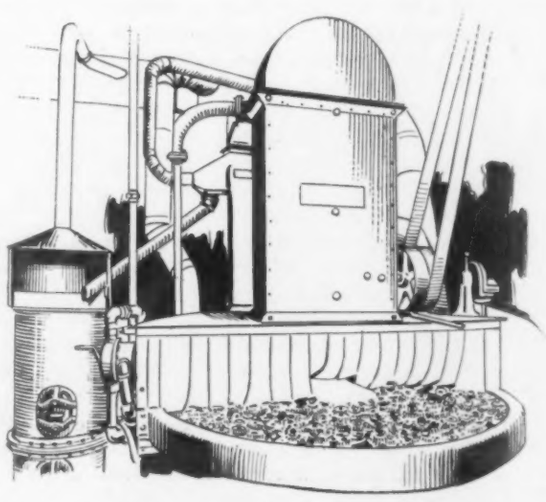


Fig. 4—Rotary Table Sand Blast Machine

which case it should have a wood paneling as the action of the sand on the brick wears the walls down very rapidly, or it may be of steel. In any case it should be tight enough to exclude the entrance of outside air which interferes with the work of the exhaust. No hard and fast rule may be laid down for the size and design of the sand-blast room. The requirements of the plant must govern each case.

Ventilation Is Important

Reference has been made to ventilation, which is a point to be clearly emphasized by means of exhausters of suitable design and centrifugal or screen type dust arresters. The former type of arresters is adapted to plants where it is desired to prevent diffusion of dust in the room where the equipment is located, and where it would not be objectionable to discharge a small amount into the atmosphere. With the latter type the dust is entirely suppressed and purified air returned to the room from which it was drawn instead of discharging into the atmosphere. This is a decided advantage and economy in the winter, as the necessity of continually warming incoming cold air is avoided.

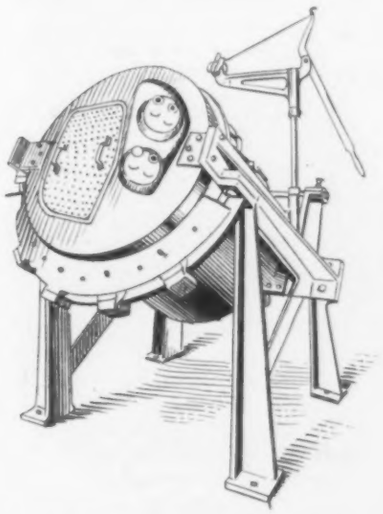


Fig. 5—Tilted Type of Sand Blast Tumbling Mill

The Question of Sand

The grades of sand best suited for the different types of machines and character of work to be cleaned is a vital question. Here again the size of the foundry is a determining factor, and one which runs generally on small and medium-size castings and uses the smallest and simplest type of machine can use ordinary silica sand that has been washed perfectly free from dust and is perfectly dry. This is No. 1 grade. This is not the best sand to use, as being already a fine grain it is soon reduced to dust, but it is usually the easiest to obtain and costs so much less than the higher grades it is expedient for the small foundry to use it. The amount of dust which the fine sand creates would be a serious matter in a large plant, while it would not be very objectionable in a small one where the sand blast is only run two or three hours a day.

For the sand-blast room and the sand-blast tumbling mill, a grade of sand illustrated at the head of the article and designated A is recommended. This grade is about as large as can be handled satisfactorily by an exhaust system. It is sharp to begin with and does not require to be used and split up into small particles in order to get the maximum cutting effect. We have heard the contention made that the sharpness of the sand has nothing to do with the cleaning effect, that it is the force with which it hits the casting that does the work. This sounds about as reasonable as saying a dull razor will cut as well as a sharp one. The most desirable sand is that which does the work the best and in the shortest time, and which creates the smallest amount of dust.

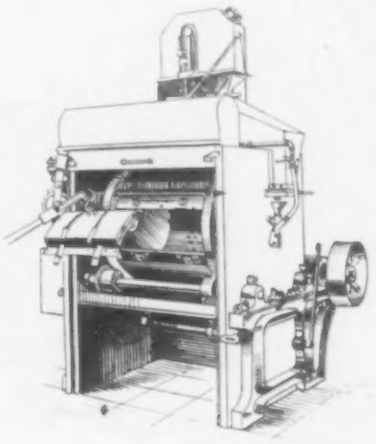


Fig. 6—Horizontal Type of Barrel Sand Blast

The cuts of sand used as illustrations are from photographs made by the writer. The sand A is abrasive material from Ohio, and it is shown as new material, and after being used for a day the difference in the appearance of the grains will show how they are reduced in diameter with use. Ocean sand, really smooth pebbles that have been worn down by the action of the waves, is better after it has been used for a short time, because it is split into smaller particles after it goes through the machine the first time and the sharp edges increase the cutting speed. For foundries located at interior points, a long way from seaboard, the freight alone on ocean sand makes it rather expensive.

The adoption of the sand-blast has undoubtedly increased the cleaning room cost of the steel founder, but it has greatly improved his work, and the increased cost is more than compensated for in the saving in tool steel where castings are to be machined. Nothing is so injurious to machine tools as the burnt sand on steel castings, and in these days of high prices for tool steels almost any cost necessary to remove the burnt sand is warranted.

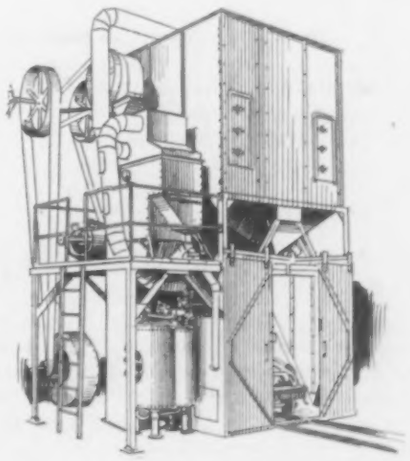


Fig. 7—The Sand Blast Room

Some Phases of American Sand Blasting

A Sand Manufacturer's Investigation Forms a Contribution to the Art—Uses Other Than for Cleaning Castings

IN a book just off the press, the United States Silica Co., Chicago, gives so much information bearing on the evolution of the art of sand blasting and its newer applications that more than ordinary comment is justified. The book was written to emphasize the merits of the sand the company manufactures for sand blasting and which it calls Flint Shot, obtained by disintegrating, washing and screening St. Peter's rock, the quarries being at Ottawa, Ill., and said to be the oldest conglomerate rock known to geology. The product consists of pure flint nodules, 95 per cent of which will pass over a 40-mesh screen, 24 per cent through a 30-mesh, and all through a 20-mesh screen. It is not only hard, but clean and round.

In its introductory to the uses of the sand in question the book states: "Sand blasting is employed for a great variety of purposes which may be roughly divided under three general headings:

Uses of Sand Blasting

Removing from castings the adhering core sand and molding sand.

Finishing metallic surfaces preparatory to painting, enameling, plating, rust-proofing, etc.

Removing mill or furnace scale from metal surfaces in order to save wear on cutting and finishing tools and forming dies"

To each of these uses a chapter is devoted. Flint Shot, it is stated, is successfully used in blowing out the cores from pipe or other tubular work and for cleaning out the deep cores in the cooling fins of steel or aluminum motor cylinders. As compared with pickling, the use of the flint sand is asserted to possess great advantages, while the wire brush, either when revolving or used by hand, is giving way to the newer process. Under the heading "Sand Blasting for Art Finish," it is stated: "The testimony from the whole automobile industry is that sand blasted bodies, whether they be made from sheet steel or aluminum sheets, also fenders and other metal parts, not only hold their enamel better, but also present a much more uniform and beautiful appearance." Emphasis is laid on the advantages resulting from sand blasting bars, especially those of chrome nickel steel prior to machining.

Reverting to castings, the anonymous author says: "It may be remarked that another angle in which sand blasting is proving of value to the purchasers of castings lies in the fact that sand blasting is in itself the most rigid 'inspector' that anybody could place on the job, as it reveals every imperfection in the casting as nothing else could."

After reviewing the various sand blast systems, attention is given to sand blast waste, in part as follows:

Utilizing Sand Blast Waste

"Unfortunately, no practical plan for reshipping and marketing sand blast waste has yet been worked out to get rid of any considerable tonnage to advantage. This is largely because the waste from different plants varies so widely in cleanness, coarseness, etc. But new cases are developing all the time and when this waste product can be used in the plant where it is accumulated, to replace products which would have to be purchased, there is a double gain. Here are some such uses:

1. As a parting in place of lycopodium, being shaken from a bag exactly the same as ordinary parting.
2. Mixed with dead core sand or gangway sand to form a very excellent core and for difficult work or very thin cores.
3. As core wash in place of silica dust bought for that purpose.
4. As a foundry facing. Of course it would not be suitable for facings of all kinds and the foundryman's judgment must come into play before taking any chances.
5. Mixed with clay for luting or sealing covers of annealing pots. Some customers report that they also use waste gangway and core in this mixture.
6. As an interlining between the brick flooring and the metal bottom of annealing and other furnaces. A layer 1½ in. thick of dry dust of this kind gives a cushioning effect to the brick which saves it from breakage under impact of heavy loads and also insulates the bottom of the furnace, greatly lengthening its life. The testimony of some customers is that this more than doubles the life of the brick flooring, one customer making changes under the new system twice a week instead of daily.

"It is quite likely, too, that this dust can be used as a mixture for making cement blocks, but as the particles of steel would lead to discoloration it would not be advisable to experiment with this except for underground purposes or where the color or the appearance of the finished block is of no consequence.

"Waste dust, when clean and white, can also be used by workmen to supplement soap in removing grease and dirt from their hands. It could not well be used as a permanent abrasive in soap as it would quickly discolor from the oxidation of the iron particles. The same objection would hold in using it in a plaster for exposed uses, though it might be used for a plaster where appearances do not count."

Recovering Blast Wastes

Under the heading: "Disposing of the Waste," it is explained that "Two principal methods of separation are employed; first, the centrifugal; second, the bolting or screening method. The centrifugal seems to be the simpler and in the main the freer from repair costs and is also less expensive in first installation. The bolting method uses in some cases wire screens and in others bolting cloth. The bolting cloth may be in the shape of long tubes in which the descending dust is met by an ascending column of air, the heavier particles falling to the bottom and the finer being blown out at the top into a receiver. Where metal screens are used the chief objection seems to be the short life of the metal owing to the abrasive quality of the dust.

"After the separation is accomplished means must be provided for carrying away the dust without its blowing all about the premises. Very good installations of this kind consist of overhead hoppers with tubular fabric spouts to carry the dust into closed wagons or cars. Another solution of the problem is by wetting the dust with a spray of water or jets of steam in order to coagulate and precipitate it before final disposition. Systems of this latter kind are recommended only where the importance of avoiding any dust whatever is sufficient to warrant the cost of maintenance. For instance, in residential neighborhoods, or where the character of the manufacturing work is such that the buildings themselves must be absolutely free from dust."

Unique Application in New Jersey

The sand blasting outfit of the Spicer Mfg. Co., South Plainfield, N. J., is thus described: "It consists of a battery of four Mott barrels, all of which deposit the heavy used sand in a trough running under the length of the series, the trough being fitted with a screw conveyor that carries the sand to an elevator which deposits it in storage tank above. The dust is carried off by an exhaust system that deposits it in a 30-in. galvanized steel down-spout outside of the building. This spout is fitted with a sprinkler system consisting of six ½-in. L-shaped spray nozzles extending outward and upward from a 2-in. center-pipe. A vat on the ground receives the dirty water, an overflow carrying the water to a drain, while the sludge is shoveled out from the bottom of the vat each evening."

In this plant the air is pre-heated before it enters the sand system, the reason being given as follows: "This is done in order to insure dry sand even in humid weather, as well as to enable them to load their sand blast barrels with wet forgings out of the curing yard, and to economize to the extent of about 25 per cent in

amount of air required of the compressor. The preheater requires a relatively very small amount of fuel or attention and eliminates all troubles due to moisture in the air or sand or on the forgings."

The book enumerates a large number of sand blast installations where work efficient beyond the ordinary has been accomplished, several of these installations being illustrated. The product of the United States Silica Co., flint shot, is not a sharp sand, but is composed of rounded flint granules, having no sharp angles or lines of cleavage. The company admits the long-standing insistence of sharp sand, but asserts that successful sand blasting depends upon the impact of the sand grains, not on their sharpness; that sharp sand has a pronounced tendency to split and splinter itself into useless dust.

CROMWELL STEEL CO.

Max McMurray President—Other Officers of the Forging and Rolling Mill Company

A reorganization of the Cromwell Steel Co., Cleveland, involving important changes, was made at a meeting held Sept. 13. This company recently placed its new steel works in Lorain, Ohio, in partial operation. The reorganization means the addition of important

MAX McMURRAY
President Cromwell Steel Co., Cleveland

new interests to the company and the securing of additional capital for carrying out the company's building program.

Max McMurray, who has been general manager of the blast furnaces of M. A. Hanna & Co. since 1904, was elected president, succeeding J. C. Cromwell. Mr. Cromwell will take an active interest in the company as soon as he recovers his health, which has not been good recently, and is scheduled to become one of the two vice-presidents. W. D. Batsholts, Paris, France, continues as vice-president. In addition to Mr. McMurray, two other Cleveland men, prominently identified by the iron and steel industry, have become associated with the company. These are Robert L. Ireland, who recently retired from the M. A. Hanna & Co., of which he was a member, and George H. Beaumont, of Pickands, Mather & Co., both of whom are on the new directorate. Other directors are J. C. Cromwell, E. S. Griffiths, president of the Cleveland Machine & Mfg. Co. and W. H, Purcell, president of the Alliance Machine Co., Alliance, Ohio, who were associated with the company before the reorganization, A. C. Ryan, who continues as general manager, Parmely W. Herrick, and George P. Steele of the First National Bank, Cleveland. Mr. Steele was elected treasurer, and G. L. Jones, secretary. The capital stock of the company will be increased from $2,000,000 to $3,500,000.

The Cromwell Steel Co. was organized a year ago by J. C. Cromwell, E. S. Griffiths and others, and late last year commenced the erection of a steel plant to make light and heavy forgings to be used largely in the automobile field. The plant is located on a site of 233 acres on the river bank in Lorain opposite the plant of the National Tube Co. The company plans ultimately to erect blast furnaces on the river bank where Lake vessels could unload directly to the plant. The plant now being built and partially completed includes four 75-ton open-hearth furnaces with ample provision for 10 additional furnaces. Two furnaces are now in operation and the ingots are being sold on the market until the finishing department is completed. The finishing equipment will include a hammer, taking the place of the blooming mill for breaking down the billets, and a 30-in. bar mill. The plant will have a capacity of 700 tons daily of forging steel. The new company has not yet worked out any plans for further extensions.

Mr. McMurray and the new directors at once took up their duties with the company. Mr. McMurray, who was born in Toronto, Canada, became associated with the Illinois Steel Co., at the South Works in 1890, became assistant superintendent of the Joliet Works in 1896, and in 1900 was appointed general superintendent of the Newburgh Works of the American Steel & Wire. Co., Cleveland, where he remained until 1904, when he became associated with M. A. Hanna & Co. He was also general manager of the United Iron & Steel Co., the Detroit Iron & Steel Co., the Penn Iron & Coal Co., all Hanna interests. He is a member of the American Institute of Mining Engineers, and of the American Iron and Steel Institute.

Renewed Activity at Ojibway

TORONTO, ONT., Sept. 17.—Plans for the erection of the United States Steel Corporation's plant at Ojibway, Ont., to cost $20,000,000, will now be carried forward, according to a statement made by Ward B. Perley, vice-president and general manager of the Canadian Steel Corporation, the Canadian subsidiary of the United States Steel Corporation. The Canadian company was incorporated about three years ago, a tract of land on the St. Clair River, north of Windsor, Ont., was purchased, a separate municipality was established and streets were laid out for an ideal town, such as the United States Steel Corporation has at its American plants. Then the war put a temporary stop to construction. The recent call for bids for the construction of a slip and huge concrete and steel docks for the Canadian company was the sign for the renewal of construction, and further plans for construction will now be proceeded with. The plant is well situated, being on the direct water route from the Lake Superior iron mines to the ocean. Hydroelectric power will be available from Niagara Falls. The operations will include blast furnaces and mills for the manufacture of wire, rails, bars and other steel products.

The Resistal reinforced safety glass is to be used in lenses for gas masks and aviators' goggles, approximately 360,000 pairs having been contracted for by the United States Government. The Strong, Kennard & Nutt Co., Cleveland, control the use of the glass for optical and other purposes, and has an exhibit at the safety exposition at the Grand Central Palace, New York, this week.

The Booth Felt Co., manufacturer of mechanical felts, including washers, gaskets, etc., has removed its Chicago plant and offices from 116 South Fifth Avenue, to 732 Sherman Street, corner of Polk Street, where it has greatly increased space in a daylight factory for manufacturing purposes.

A Simple System of Foundry Accounting

Continuous Record of Progress of Orders, Allowing Quick Replies to Customers' Inquiries and Eliminating Weighing Delays on Shipment

BY RODNEY DERBY

CONSTANTLY narrowing margins of profit on castings have forced foundries to devote more and more attention to methods of accounting. An example of this movement is the several years' committee investigations of the American Foundrymen's Association. A well known firm of accountants has been engaged as advisory counsel to direct the investigation and formulate a method of accounting which can be adopted with modifications to various foundries.

As foundry accounting is the topic of the hour, the system outlined herewith may prove of interest. In general it is simple, easily understood and can readily be modified to suit the average foundry, whether engaged in jobbing or in manufacturing their own castings exclusively. The dominant idea has been to eliminate red tape and yet record in quickly available form pertinent facts in regard to costs, progress of orders and the usual foundry routine.

There are four fundamental features that should appeal to the average foundryman.

1. Complete information at hand at all times to answer inquiries from customers or departments relating to the progress of casting orders and shipments. This feature eliminates the usual "I'll look it up and let you know" method of answering.

2. A follow-up system provided with a daily check on the progress record of casting orders, such as number of good castings, or defective castings, castings shipped, ready to ship, or balance to be made.

3. Labor distribution sheets whose extended totals check with the weekly payroll. These same sheets are virtually a journal of daily production and can be used in many ways to ascertain routine data.

4. A system of weighing and recording weights that distributes the work equally throughout the day for the shipping clerks, thus doing away with rush weighing at the shipping period and the consequent chances of error.

Under many systems castings are weighed when shipped, which usually results in the congestion of several trucks at the shipping doors and causes unfavorable comments from customers who follow closely their trucking costs. With the system described the castings are snagged, sorted, weighed and stored in bins until the arrival of a customer's truck. They are then quickly transferred from the bins to the truck with a check on the count to agree with the shipping tickets.

The accompanying illustrations show five forms of records for compiling the data outlined. Form 1 is a loose leaf daily production sheet kept in the main office for a record of the so-called productive or direct skilled labor charges, castings molded and data pertaining thereto.

Form 2 is a sheet that serves a similar purpose for the record of the direct and indirect unskilled labor charges.

Form 3 is a permanent record card which is made out for each pattern number. The items on both production sheets according to order numbers—with the exception of the weights and the nonproductive labor—are posted to this card. The cards are filed in the main office.

Form 4 is a card with squares numbered from 1 to 9, representing the number of hours opposite the various classifications of unskilled labor. The time of the unskilled labor is recorded by punching a card for each workman. These cards are posted to sheet form 2 and the overhead labor charges can be deduced from this sheet. The combined extended labor totals of sheets 1 and 2 check with the weekly payroll.

Form 5 is a progress card filed on each molders' floor and is the source of supply for the records of molders' time and number of castings made on sheets form 1 and the shipping data on card form 3.

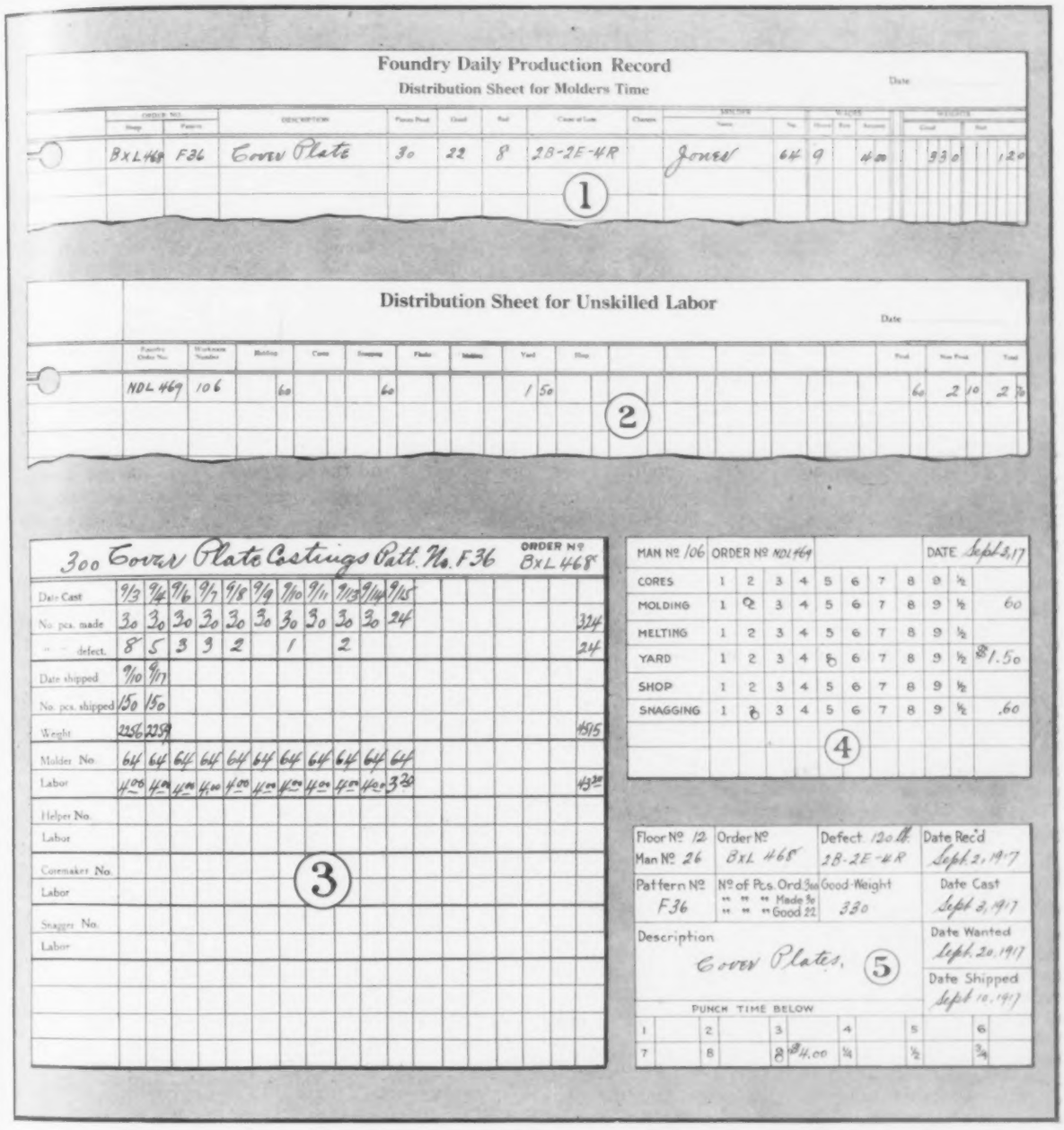
When an order is received, card form 3 is made out. The back of this card can be ruled suitably for billing, shipping and mail address information. The order number, B X L 468, is given to the order. B X is the code that denotes the customer's name, and 468 is the rotation number of the foundry production order series L. The tabs of the index bear the code numbers, and cards are filed in numerical rotation behind their respective tabs.

Card form 5 is made out and goes to the molder, with the pattern, to denote the number of castings to be made. When production starts this card is returned to the office after the first day's work and a new card is made out for the remainder of the order. This second card goes through the same routine. The first card then goes to the shipper, who finds the castings, weighs them, and records the weights on the card. The good ones are placed in the customer's bin and the bad ones returned to the cupola. This card then goes to the office if there are defective castings, and to the shippers' file if all are good. Yellow replacement cards are made out in the office for all defective castings; these cards are ruled like form 5.

When proceeding with shipping, each customer's cards for castings weighed and stored in bins are taken from the shippers' file and shipping tickets are made out from the records thereon. As the castings are transferred from bin to truck a count is made to check with the ticket record. A copy of this ticket with the cards that belong to it goes to the office. As the weights and number of castings classified by patterns appear in total form on the shipping ticket, they are posted from the ticket to card form 3.

When an inquiry comes over the 'phone, or otherwise, as to the status of production on any pattern, the office clerk can readily select the right card form 3 by means of the order number and pattern number. An addition and subtraction of the items will show how many castings have been made and how many have been shipped. 'Phone inquiries can therefore be answered immediately.

By going over these cards at regular intervals each week production and shipping can be closely followed. If production or shipping lag on any one pattern or series, the age of the dates will quickly



Foundry Daily Production Record

Distribution Sheet for Molders Time

Date

Shop Order No.	Pattern No.	Description	Pieces Prod.	Good	Bad	Class of Work	Checks	Name	No.	Hours	Rate	Amount	Weight Good	Weight Bad
BxL468	F36	Cover Plate	30	22	8	2B-2E-4R		Jones	64	9		4.00	330	120

1

Distribution Sheet for Unskilled Labor

Date

Factory Order No.	Workmen's Number	Blocking	Core	Snagging	Flasks	Moulders	Yard	Shop	Prod.	Non Prod.	Total
NDL 469	106	60		60			1 50		60	2 10	2 70

2

300 Cover Plate Castings Patt. No. F36 ORDER No. BxL468

Date Cast	9/3	9/4	9/6	9/7	9/8	9/9	9/10	9/11	9/13	9/14	9/15					
No. pcs. made	30	30	30	30	30	30	30	30	30	30	24					324
" " defect.	8	5	3	3	2		1		2							24
Date shipped	9/10	9/11														
No. pcs. shipped	150	150														
Weight	2258	2259														4515
Molder No.	64	64	64	64	64	64	64	64	64	64	64					
Labor	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.20					43.20
Helper No.																
Labor																
Coremaker No.																
Labor																
Snagger No.																
Labor																

3

MAN No. 106	ORDER No. NDL469									DATE Sept 3,17
CORES	1	2	3	4	5	6	7	8	9 ½	
MOLDING	1	2	3	4	5	6	7	8	9 ½	60
MELTING	1	2	3	4	5	6	7	8	9 ½	
YARD	1	2	3	4	5	6	7	8	9 ½	$1.50
SHOP	1	2	3	4	5	6	7	8	9 ½	
SNAGGING	1	2	3	4	5	6	7	8	9 ½	.60

4

Floor No. 12 / Man No. 26	Order No. BxL 468	Defect 120 lb. 2B-2E-4R	Date Rec'd Sept 2, 1917
Pattern No. F36	No. of Pcs. Ord 300 / " " " Made 30 / " " " Good 22	Good Weight 330	Date Cast Sept 2, 1917
Description Cover Plates. 5			Date Wanted Sept. 20, 1917
			Date Shipped Sept 10, 1917

PUNCH TIME BELOW

1	2	3	4	5	6
7	8	8 $4.00	¼	½	¾

A Few Forms Give Continuous Record of the State of the Foundry Order and Direct and Indirect Labor Costs

show it. Tracers in the form of lists of delinquent order and pattern numbers can be made out for the foreman and shipper, who must report reasons for delay.

As sheets 1 and 2 are virtually a daily journal of each employee's work during the day, a daily study of these sheets and a comparison with previous sheets will give information that should enable the management to keep production in the right proportion to the payroll. The "day's work put up" by each molder and his percentage of defectives can be so closely followed that his worth can be readily determined. Likewise the daily averages of casting tonnage, defectives, direct and indirect labor costs per ton can be ascertained from the totals.

It will also be found that the groupings and totals of labor, weights, etc., will be in convenient form to use as a basis in determining overhead expenses, melted metal costs, etc., and will readily dovetail into established systems. It is not the intention to cover in this article these subjects in detail, as they are worthy of an article by themselves.

The system as outlined is something that should prove valuable to the average foundry to answer inquiries promptly, to group labor costs, to ascertain daily tonnage of good and defective castings, as well as serve as a guide and follow-up on the progress of production and shipping.

To Manufacture Chucks in Chicago

The Nielsen-Barton Chuck Co., Chicago, has been formed to manufacture the Eclipse roller-bearing drill chuck, formerly manufactured by the Eclipse Machine Co., Elmira, N. Y., the new company having purchased the patent rights, jigs, fixtures and machinery with which the chucks have been manufactured. A shop at 106 South Jefferson Street, Chicago, is now engaged on a lot of 2000 chucks, and it is expected that deliveries will begin in 30 days. The chucks will be marketed by the H. E. Barton Tool Co., 106 Jefferson Street, Chicago, which also represents makers of twist drills, reamers, cutters, taps and dies, hack-saw blades, files and high-speed tools.

The Eclipse chuck is of the self-closing type and has been made about five years. It can be tightened sufficiently with the thumb and forefinger to start drilling, after which it automatically grips the drill. Keys or spanner wrenches are unnecessary.

May Exceed 40,000 Aviation Engines

Large Plans of the Government—Creation of an American Motor Standardized and of Minimum Weight

WASHINGTON, Sept. 18.—The Liberty motor, a standardized, minimum weight, high-powered aviation engine, work on which was begun at the Bureau of Standards early in June, is pronounced a complete success in an official statement promulgated by the Secretary of War. It is the lightest engine per horse power ever constructed for airplanes, and will be the main reliance of the United States in the rapid production in large numbers of high-powered battle planes for service in the war. The entire producing capacity of the United States for engines of this type will now be concentrated upon the manufacture of this engine with the object of equipping as many as possible of the 22,000 airplanes embraced in the aviation program. As it is expected that the great majority of these planes will be supplied with the new motor and as in service two engines will probably be required for each plane, the output of the Liberty motor during the coming year may exceed 40,000 complete engines.

The new motor represents the best features of all the airship engines heretofore produced in this or any other country. Light weight and great power having been achieved early in the designing of this motor, perfect standardization was the next object aimed at. Cylinders, pistons and every other part of the motor have been most accurately standardized so that they can be produced rapidly and economically by a great many factories operating under Government contracts. They may be as rapidly assembled either by these plants or at a central assembling plant.

Standardization and Pooling of Secrets

The standardization of parts materially simplifies the problem of repair and maintenance. Spare parts will be promptly available at all times. Even the cylinders are designed separately. It is possible to build the new engine with four models ranging from 4 to 12 cylinders and the standardization plan makes possible an 8-cylinder or a 12-cylinder model by merely assembling the necessary cylinders, pistons, valves, cam shafts, etc. So carefully has the scheme of standardization been worked out that parts of wrecked 8-cylinder or 12-cylinder engines will be interchangeable and a new engine may be readily assembled from parts of machines that have been put out of action. This feature will make the matter of repairs back of the lines comparatively simple.

In a formal statement given out here the Secretary of War states that he regards the invention and rapid development of this engine as one of the really big accomplishments of the United States since its entry into the war. More than a score of engineers pooled their skill and many important trade secrets in the development of this design, working with the encouragement of the Aircraft Production Board, of the War Department and of the Bureau of Standards.

"The story of the production of this engine is a remarkable one," says Secretary Baker. "One of the first problems which confronted the War Department and the Aircraft Production Board after the declaration of hostilities was to produce quickly a dependable aviation motor. Two courses were open. One was to encourage manufacturers to develop their own types; the other to bring the best of all types together and develop a standard. The necessity for speed and quantity of production resulted in a choice of the latter course and a standard motor became our engineering objective.

Creative Work Under Pressure

"Two of the best engineers in the country, who had never before seen each other, were brought together at Washington and the problem of producing an all-American engine at the earliest possible moment was presented to them. Their first conference on June 3 lasted from afternoon until 2:30 in the morning. These two engineers were figuratively locked in a room in a Washington hotel and charged with the development of an airplane motor for use by American aviators over the battlefields of Europe. For five days neither man left the suite of rooms engaged for them. Consulting engineers and draftsmen from various sections of the country were brought to Washington to assist them. The work in the drafting room proceeded continuously, day and night. Each of the two engineers in immediate charge of motor development alternately worked a 24-hour shift.

"An inspiring feature of this work was the aid rendered by consulting engineers and motor manufacturers who gave up their trade secrets under the emergency of war needs. Realizing that the new design would be a Government design and no firm or individual would reap selfish benefit because of its making, the motor manufacturers, nevertheless, patriotically revealed their trade secrets and made available trade processes of great commercial value. These industries have also contributed the services of approximately 200 of their best draftsmen.

"The two engineers locked together in a hotel room in this city promised the Government if given an opportunity, they would design a satisfactory engine before a working model could be brought from Europe. A remarkable American engine was actually produced three weeks before any model could have been brought from Europe. It was promised that this engine would be developed before the Fourth of July. Twenty-eight days after the drawings were started the new engine was set up. This was on July 3. In order to have the engine in Washington and in actual running order at the Nation's capital on Independence Day the perfected engine was sent from a Western city in a special express car. The journey was made in 21 hours and four young men guarded the engine en route to Washington and personally attended to its transfer from one railroad to another.

Engine Parts from Twelve Plants

"With the need for speed as an incentive tools for building the first engine were made even before the drawings were finished—on the assumption that they would be correct. Parts of the first engine were turned out at 12 different factories, located all the way from Connecticut to California. When the parts were assembled the adjustment was perfect and the performance of the engine wonderfully gratifying. This in itself demonstrates the capabilities of American factories when put to the test and when thoroughly organized for emergency work of this sort.

"One of the chief rules outlined at the beginning of the designing work was that no engineer should be permitted to introduce construction which had not been tried out. There was no time for theorizing. The new engine is successful because it embodies the best thought of engineering experience to date. Not only did this country furnish ideas through celebrated consulting engineers, but the representatives in the United States of England, France and Italy co-operated in the development of this motor.

"Thirty days after the assembling of the first engine preliminary tests justified the Government in formally accepting the engine as the best aircraft engine produced in any country. The final tests confirmed our faith in the new motor in every degree. Both the flying and altitude tests of the new motor have been gratifying. One test was conducted at Pike's Peak, where the United States aviation engine performed satisfactorily at this high altitude. One of the engines, in an airplane, broke the American altitude record in a recent flying test.

The standardized United States aviation engine, produced under Government supervision, is expected to solve the problem of building high-class, powerful and yet comparatively delicate aviation engines by American machine methods—the same standardized methods which revolutionized the automobile industry in this country. With the completion of final tests of the motor—tests which satisfied and gratified both expert engineers and army officers—progress already has been made toward organizing industry for the manufacture of the new machines and deliveries will begin within a comparatively short time."

The formal adoption of the Liberty motor by the Aircraft Production Board does not mean that there will be no change in it during the war. There will be continuous experimentation as new types and improvements develop at the front and new ideas are born of the war emergency. If the engine can be improved it will be improved, but as the motor stands today it is a notable success. Construction of the new standard engine will not interfere with the manufacture of other serviceable models, either European or American, which existing plants are already turning out. The production of the Liberty motor will be carried on almost entirely in a new and expanding industrial field.

In explanation of the fact that the United States has not adopted one of the successful British or French high-powered airplanes and engines, the War Department states that they are not as a rule adapted to American manufacturing methods, being highly specialized and requiring much hand work from specially skilled mechanics with long experience. Not less than a year would be required to perfect organizations capable of turning out such highly specialized machines.

W. L. C.

Developing Japan's Iron Industry

Japan's output of iron ore is not sufficient to meet the demands of that country's iron and steel industry, according to a series of articles in the *Financial and Economic Review*, a Japanese paper, by Dr. Jisaburo Yokobori. At present large quantities of iron ore come from Korea, Manchuria and China; indeed, the Tayeh mine in the Hupeh Province, China, supplies more than half the quantity required at the Government foundry at Wakamatsu, and the Oriental Iron Foundry Company, recently organized by Japanese business men, will get the materials from the Tao Chung mine in the Anhwei Province, China, the quality of which is even superior to that of the ore that is obtained from the Tayeh mine. Before the outbreak of the war freight rates between Korea and Wakamatsu ranged from 2 to 3 yen (96c. to $1.44) per ton of ore, and those between the Yangtse River and Wakamatsu averaged nearly 3 yen. Two tons of ore and seven yen (about $3.36) worth of coke are necessary to produce one ton of pig iron, which sells for 20 yen (over $9.75) in ordinary times. When imported materials are used the cost of production, excluding the price of ore and refining expenses, is 12 to 13 yen (more than $5.76 to $6.24) per ton of pig iron. The Government foundry at Wakamatsu, however, is getting the product of the Tayeh mine on comparatively easy terms, because of its connection with the Tayehping Iron and Coal Co., which owns the mine.

Dr. Yokobori next considers the supply of coal, of which Japan produces enough in Kyushu and Hokkaido. There is every prospect of increasing the output from the collieries in the north of Kyushu, while it might be said of the coal industry in Hokkaido that it is just beginning. He is very hopeful of the future of Hokkaido as an iron manufacturing district.

The Whiting Foundry Equipment Company, Harvey, Ill., has issued a series of bulletins of a patriotic character which are attracting much attention. One of them is in the cause of food conservation, giving the recommendations made by Food Administrator Hoover, and the other, looking forward to the next Liberty loan, urges the saving of money to invest in the second issue to help win the war.

INDUSTRIAL EXEMPTIONS

Several Thousand Claims Pending for Munitions Workers and Others

WASHINGTON, Sept. 18.—The situation with respect to the drafting of skilled workers, especially those employed in munitions factories, is becoming acute. Several thousand claims for army exemption on the ground that the claimant is indispensable to a war industry have been received by the office of Provost Marshal General Crowder for reference to the President, who is the appellate judge in such cases. Preliminary examination is being made by General Crowder on whose final recommendation the President probably will act, as it is obviously impossible for him personally to examine every case. The Provost Marshal General has decided that no personal hearings will be granted by his office and notice has been promulgated that it will avail claimants nothing to employ attorneys or other agents to press their pleas.

According to information received here from Bridgeport, Conn., the factories of that city, which are very largely engaged in the production of war material, will lose an average of 23 per cent of their skilled workmen by the draft. These figures have been carefully prepared by the State Council of Defense and have been officially forwarded to Washington. Some of the more important plants, it is said, will lose as high as 50 per cent of the men, while the lowest percentage is 6. A large number of appeals from the draft on industrial grounds have been carried to the district appeal board but so far only one full exemption, presumably covering entire factory, has been made. In about three-fourths of the cases the appeals were denied. Provost Marshal General Crowder has sent the following telegram to the Governors of all states:

Please communicate to all local and district boards and give the widest possible newspaper publicity to the following:

1. By the regulations of the President governing appeals from the action of district boards the claim of appeal must be filed with the district board and cannot be received if sent direct to the President, the Provost Marshal General, members of Congress, or to any other place than to the district board itself.

2. Papers, evidence and affidavits not considered by the district board cannot be considered on appeal from the district board.

3. The only cases in which there is an appeal to the President are cases in which a claim for discharge on the ground of engagement in agriculture or industry has been made in the district board. There is no appeal to the President from the action of the local board in dependency or other cases whose determination is within the jurisdiction of the local board.

4. All attempts to appeal cases other than those involving the decision of the district board on agricultural or industrial exemptions from whatever source received; all affidavits, letters, arguments, evidence, papers, or other matter not considered by the district board; all appeals made to the President direct or sent to any other official or person in Washington, will have to be returned to the sender.

Inasmuch as the rulings of the President are made upon the recommendations of the Provost Marshal General's office based upon the papers accompanying appeals, industrial managers desiring to secure exemptions for indispensable men should exercise great care in preparing their affidavits to render them strong and conclusive. The fact should be borne in mind that mere employment in an establishment engaged in producing war material for the Government is not a sufficient basis for exemption. Indispensability is the sole criterion recognized by the authorities here. A fair working rule for such exemptions is the fact that the place of an employee whose exemption is asked cannot be filled without devoting a substantial amount of time to the training of a substitute, pending which Government work will suffer more or less delay. W. L. C.

The John Illingworth Steel Co., whose plant and main office are at Frankford, Philadelphia, has opened a branch office in the Astor House Building, 217 Broadway, New York, for the sale of its products, which are chiefly cold rolled and cold drawn shapes and bevels.

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Bonds, Taxes and Prices

The principle the Government is endeavoring to observe in floating bonds, imposing taxes and regulating prices is that there is a delicate balance among these three things so that for the best results certain proportions should exist. The floating of large bond issues tends to produce inflation, and while some inflation is necessary there should not be too much. The imposing of taxes tends to restrict inflation and thus while taxes are necessary they are also economically sound. The regulation of prices may be essential, in certain directions, not simply to prevent the Government paying too much for what it buys, but also for the purpose of protecting buyers and distributing or allotting the ability to pay taxes.

These principles are well recognized, as to conditions that may exist during the war, but the immediate problem is so important that no corresponding amount of attention has been given to conditions after the war. It would be a fine thing if it were possible so to arrange affairs as to loans, taxes and price regulation that the transition from war conditions to peace conditions would create a minimum of disturbance. At the end of the war the Government presumably will cease borrowing. The construction of merchant ships will necessarily continue, but there would be something radically wrong with the situation were it to appear desirable for the Government itself to continue to build ships. The war taxes now being formulated by Congress will cease with the war and a new program of taxation will then have to be adopted. That will cause a disturbance in the balance. Government price regulation will also cease, creating another influence. Prices that are made in the open market will be subject to their own influences. Some prices will tend to fall, while it is quite conceivable that others will tend to rise, by reason of the changes in relation between demand and supply caused by the transition from war to peace conditions.

Keener sighted business men have lately been thinking more of trade conditions after the war and less of trade conditions during the war. There has been a distinct change of interest. It is human nature to desire to cling to "war profits," and it is hardly worth while to criticise human nature, but it is coming to be realized that war profits are not all that lie before American business men. All precedents teach that business is good after a war, and all comparisons of the present war with those of the past indicate that the principle is even more applicable in this case than in others.

Considering bonds, taxes and prices during and after the war, it seems fair to maintain, with regard to bonds, that if a reasonable degree of inflation is desirable during the war, to promote the flotation of bonds, a sort of wholesome inflation, then a similar condition after the war, in moderation, is not necessarily undesirable. Without something of this sort there cannot be the expansion that is to be desired. Inflation toward the close of a period of great trade activity has always brought undesirable results, but there is a distinction. Such inflation occurs because men do not see the end of the period, whereas no one assumes that the present war will be of indefinite duration. If such a view were entertained it would prevent the inflation.

With respect to taxes, it would undoubtedly be an error to assume that at the end of the war there will be opportunity for a great reduction. While it is impossible at this time to forecast the annual amount that will be raised by taxation and the quantity of bonds that will be issued, less the amount upon which our Allies will pay the interest, it is certain that the interest will be a very considerable part of the tax levy. Congress has not determined finally what the rates of taxation will be, and beyond that the Congressional "estimates" of what one tax rate or another will produce are largely guesswork. If bonds are issued at intervals up to the close of the war, the full interest charge will not begin until that time. If, for illustration, the bond rate is 4 per cent and the taxes represent 12 per cent of our cost of the war then, roughly speaking, a reduction of two-thirds in the rate of taxation after the war would leave the Government with only sufficient revenue to pay the interest. There would be nothing left for retiring the bonds. If a reduction of only one-third were made the contributions to sinking fund would not be very large. The remaining cost of the war would be spread over a long period. It is true that a part of our war expenditures consists in the building of merchant ships, representing the investment

of capital which will earn some money, but the investment will be on a competitive basis with the rest of the world's merchant marine and may earn no large sum over a period of years.

With respect to prices, by far the best thing that could occur would be for such a scale of prices to be developed during the war that business could adopt it without hesitation after the war. When prices in our markets rose some time after the European war started, the view was promptly adopted that when the war ended there would be a period of depression, to allow for a general and drastic price realignment. That may still be necessary; but everything that can be done to forestall the necessity, to reduce the extent of the readjustment required, will prove to be a positive and valuable asset. The delicate relations that exist between bonds, taxes and prices should be considered not as a feature alone of the war time but as a feature also of the peace time that is to follow.

The Highest Trade Balance

It is quite clear that the fiscal year 1917 precisely marked the high point in our favorable balance in the foreign trade. There was an almost unbroken rise in the monthly trade balance until January, 1917, while thereafter there were some declines, and a scrutiny of the monthly balances shows that the best period of twelve consecutive months fell upon the fiscal year 1917. The preliminary figures for July show a very great decrease from the July a year earlier. The favorable merchandise trade balances in calendar and fiscal years are shown below:

	Favorable Balances	
	Calendar	Fiscal
1912	$581,084,638	$551,057,475
1913	691,421,812	652 875,915
1914	324,348,049	470,653,491
1915	1,776,074,152	1,094,419,600
1916	3,089,769,254	2,135,599,375
1917	.....	3,634,450,905

The trends in our foreign trade have been simple, the figures telling a plain and succinct tale. Exports increased to a maximum of $613,555,693 in January of this year, in which month there was the record favorable balance of $371,848,411. Imports, which had previously been increasing, continued to increase after January, reaching the record high of $306,622,939 in June, while exports decreased, though by a less amount than that by which imports increased, and the June favorable balance was only $268,587,110. This was, however, a larger balance than had been shown for any month prior to July, 1916, and the total for the twelvemonth ending last June was, as noted above, the largest shown for any consecutive twelve months. The record could only be broken by the balances running heavier in succeeding months.

July, however, has shown nothing of the sort, the trade balance dropping to $148,000,000, produced by $226,000,000 of imports and $374,000,000 of exports. Comparing June and July, imports decreased 26 per cent, exports 35 per cent and the trade balance 55 per cent.

The restriction upon exports involved in the successive embargoes should not in themselves produce a decrease in the value of merchandise exported. Our transatlantic Allies are relatively near at hand and in so far as the embargo operates to divert shipping to this trade the volume and value should increase rather than decrease. By the same token our imports should decrease as our Allies have less goods to send us than have neutral countries from which shipping may be diverted.

There are, however, two factors of much greater importance—the general decrease in merchant shipping, a not inconsequential item, and the more important factor that our Government takes a great deal of shipping for the transport of troops and of supplies to France. Merchandise thus taken out of the country will not, of course, appear as exports. The British Board of Trade has never included such movement in its returns and there is no reason why this country should compile its statistics in different form. While this seems to be perfectly obvious it may be remarked that some complications will eventually arise. For instance, we are building a railroad in France and we shall hardly take the material back after the war, and if the Government effects sales, after the war, some place may have to be made in the statistics for the transactions.

While our exports promise to be smaller in future than during the fiscal year just ended it is reasonably certain that they will continue very large, for the billions of dollars loaned by the Government to our Allies must result in merchandise exports. Thus with these and some other exports, and with necessarily reduced imports, the trade balances are bound to be large compared with all records prior to the last twelve or eighteen months.

A War Lesson for Industry

The announcement by Major-General Gorgas of the selection of nineteen cities as tentative sites of "reconstruction hospitals" for the work of rehabilitating wounded soldiers for private life calls attention to the splendid work now being accomplished by Belgium, France, England and Canada. One of the essentials of this work is the establishment in connection with the hospitals of professional schools of the technical and trade types for the training of maimed and crippled soldiers in new trades, so that they may become productive assets of society and self-respecting citizens.

This is a magnificent and fruitful service. It should not stop with work merely among crippled soldiers. A great duty that both Government and public have too long neglected is the establishment of hospitals and training schools to save the thousands crippled each year in industry from the disgrace of inactivity and dependence upon the bounty of others for the rest of their lives, and to enable them to continue to contribute to the national welfare. Results already achieved abroad demonstrate beyond question that the nation can be spared the burden of thousands of unproductive citizens by intelligent collaboration of surgeon and educator. Such schools result not only in the complete or partial removal of dependency but also, and equally important, in a complete change of mental attitude and a restoration of happiness, confidence and initiative to the crippled man.

The employment of surgical and orthopaedic skill to help men to overcome the obstacle of lost or immobile limbs or the loss of one of the sense organs,

supplemented by trade re-education, is not primarily a development of this war. The great schools for disabled soldiers and sailors at Rouen, Lyons, Montpellier and other places in France, and the Belgian schools at Le Havre and Vernon have been established under the direction of Belgians who learned the needs and methods of such institutions at the famous Labor College of Charleroi, founded some years before the war to teach disabled laborers new trades. The province of Hainault, Belgium, in which Charleroi is situated, is comparable in the character of its industries with our Pittsburgh district, as it was the center of great metal working and coal mining industries. By 1914 similar schools had been founded in Brussels and Tournai. The school at Charleroi at the end of 1914 had 1500 pupils. Two of the most perfect schools now operating in France are at Lyons and were founded by M. Baseque, a Belgian refugee and formerly professor at Charleroi. At L'Hopital Anglo-Belge, Rouen, and its annexes at Orval and Saint-Aubin lez Elboeuf, a great work is going on in charge of Dr. Armand Deltenre, director of the Belgian Army Medical Service.

Surely the lesson of these institutions will not be lost on American industry. Prof. Jules Amar, director of the Laboratoire des Recherches sur le Travail Professionel, Paris, is authority for the statement that 80 per cent of maimed or mutilated men are re-educable. Of these, 45 per cent can be fitted to earn normal salaries, on condition that at least 10 per cent specialize within the limits of their former trades; another 20 per cent will attain an appreciable output but may not arrive at full working capacity; the remaining 15 per cent will have to practice subordinate trades as their re-education will be fragmentary. It is fair to assume that the disabling effects of injuries received in industry do not vary greatly from the effects of war wounds. The figures of Professor Amar are sufficiently promising to warrant as strong a public interest in the rehabilitation of injured workmen as in that of injured soldiers. Manufacturers appreciate the growing burden of the cost of compensation for injuries but only the litte group carrying on our organized charities appreciates the tremendous cost of enforced idleness or the mental suffering of those unfortunate enough to have to eke out a pension by taking up the secondary posts that industry and society have to offer the maimed citizen.

The urgency of this work has not been recognized. If the projected Government institutions are actually established, we shall have object lessons in our own land worthy of study by every taxpayer and public-spirited citizen. It is to be hoped that the work initiated for wounded soldiers will set an example that will endure as a part of our municipal, State and national program.

Rapid Progress of the Safety Movement

The sixth annual safety congress of the National Safety Council, held in New York last week, with its large attendance, its strong papers and its able discussions by wide-awake, progressive men, furnished impressive evidence of the growth of the safety movement in this country in the past few years. One of the most gratifying features of recent progress is the action of the Navy Department at Washington in placing a safety engineer at each of the navy yards now employed on Government work. Being engaged in a great war, the Government is able to obtain the services of engineers of high grade and extended experience who are sacrificing salaries and going into the work with enthusiasm for purely patriotic motives. These men intend to continue in the service until they see it thoroughly established and then retire in favor of others, but they will not leave until they know that others can carry on the good work. Thus one of the results of the war will be the building of a splendid system for the promotion of safety which otherwise might never have been constructed.

The present National Safety Council, with its 3000 members, is an outgrowth of a meeting of a mere handful of men six years ago. The movement has progressed because it was founded upon sound, ethical and economical reasons. It will make still further progress, as a few important facts are dwelt upon so that all manufacturers and their employees alike will become convinced that:

First, three-fourths of all accidents are preventable.

Second, that it is known how these accidents can be prevented.

Third, that investment in prevention brings the greatest return of any kind of capital invested in a manufacturing plant.

Fourth, that in order to prevent accidents employees must be trained to do their part, for upon them rests fully three-fourths of the responsibility; in other words, the machine alone will prevent one-fourth of the number of accidents which the machine and men working together can prevent.

As the above facts are borne home, thousands of lives will be saved, an untold amount of suffering will be prevented and the safety movement will receive a great impetus.

Under the heading "An Economical Crime," the *Northwestern Miller* discusses the action of Congress in guaranteeing a price of $2.20 a bushel on the wheat crop for 1918. That journal expresses the opinion that if the war should end before the crop, estimated at 1,000,000,000 bushels, is harvested, the price of wheat everywhere except in the United States would rapidly decline and it is probable that in England, for example, it would be somewhere near 60 cents. In that event the United States Government will be compelled to pass on the charge of $2 to the consumer or resell the wheat at the world's price and pocket the loss, which is likely to amount to not less than $1,000,000,000 and might amount to $1,500,000,000. The *Miller*, however, does not point out what is the most unfair feature of this kind of price fixing, which is that it grants a special favor to the farmer while manufacturers and miners are compelled to accept lower than the prevailing market price. For the Government to expect miners of bituminous coal to sell their product at $2, which is considerably below the market price, while the farmer is guaranteed $2 or about twice the usual market price, is rank discrimination.

CORRESPONDENCE

Will Accept Old Tracings and Convert for Red Cross Uses

To the Editor: Old and discarded tracings on cloth are of no value to any one, but they would make good bandages and handkerchiefs for soldiers. In every drawing room there are a great many of such tracings that will never be of use. These could be washed, ironed, and then turned over to the Red Cross Society. Any laundry should wash and iron these free of charge, but for any firm which will send these old tracings prepaid to the Shartle Brothers Machine Co., Middletown, Ohio, maker of paper mill machinery, that company will run them through its shop laundry. After they have been washed, they will be made into handkerchiefs and bandages and turned over to the Red Cross Society.

This certainly ought to bring forth from dark places a lot of material which is to-day very scarce and very high in price and put it to the best possible use. Now is a good time to clean up your old files.

CHAS. W. SHARTLE.
President Shartle Brothers Machine Co.
Middletown, Ohio.

British Export and Controlled Prices for Steel Bars

Some light may be thrown on the question whether Great Britain is selling steel products to her Allies at higher prices than those controlling her domestic market by the following table which shows the British official figures for exports of steel bars in the first half of 1917 and the average export price, also the exports of steel bars to France with the average price on these shipments:

British Exports of Steel Bars and Their Values

1917	Exports, Gross Tons	Average* Value per Ton in £	Official Control Price per Ton in £	Exports to France, Gross Tons	Average Value of Exports to France
January	26,293	24.2	15.5	19 044	16.8
February	39,242	23.0	15.5	33,662	16.0
March	38,057	23.1	15.5	.....	...
April	27,840	23.4	15.5	.....	...
May	19,537	24.8	15.5	.....	...
June	25,650	25.0	15.5	.....	...

*These values in each case represent the average of the months of the year preceding and including the month estimated; for example the £23.1 set down for March is obtained by dividing the total shipments for January, February and March into the total value for those months. Values are not given for each month's shipments.

Since February the destination of exports of bars has not been given. It is evident, however, that there is considerable difference between the official control price of £15 10s. per ton tested (£15 untested), and the average export price of £23 to £25 per ton. The price to France is also quite a little in excess of the control price in the domestic trade. The high average value of export bars may be due to the fact that crucible steel exports are included in the bar classification. It will be seen that in January and February France took 80 per cent of the exported bars. In the remaining 20 per cent must have been included considerable high-grade steel to bring the valuation up nearly 50 per cent above the average value of the shipments to France.

A proposal for the extension of Kimball Street, Fitchburg, Mass., has developed the fact that Manning, Maxwell & Moore, Inc., New York, owner of the Putnam Machine Co., has plans for the erection of a steel rolling mill to cost about $500,000 on the land in question, although the erection will probably be postponed for some time due to the high cost of materials and equipment now prevailing. Nothing definite has been decided upon, but at the meeting of the city council Herman F. Brandes, local manager for the company, stated that there was a probability of such use of the land.

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NATIONAL SAFETY MEETING

Some of the New Angles Developed at Last Week's Congress

LABOR turnover, the result in part of the continued influx to industries of men unfamiliar with methods and equipment; the industrial physician and the industrial nurse; the difficulty of promulgating safety regulations without antagonizing the employees, and a notable reduction in numbers of accidents came in for attention at the sixth annual safety congress held in New York last week at the Hotel Astor by the National Safety Council. By far the greater number of accidents, it appears, occurs to those employed for a period of less than 30 days. The welfare movement as a means of minimizing the numbers of roving workmen was thus regarded as necessarily close to the safety movement. To educate the man in the shop on safeguarding matters and to secure his co-operation the industrial doctor and nurse are held as of first importance, and it was urged that these individuals must have high qualities of personality and sympathetic interest calculated to maintain the humanitarian as well as the professional side of their work. It was brought out that the number of accidents in manufacturing began to increase early in 1914, reached a peak in 1916 but receded sharply in 1917, due, it was stated, to more efficient organization for increased production.

New Basis for Expressing Accident Statistics

A uniform method of expressing accident statistics by establishing for each casualty a definite number of hours of employment lost was urged by Dr. Lucian W. Chaney, Department of Labor, Washington. His ideas were explained at length in THE IRON AGE of Sept. 13. He offered the following statistics as obtained in the iron and steel industry from 1910 to 1914:

Frequency Rate

Deaths	1.2 cases per 1000 men
Permanent injuries	3.9 cases per 1000 men
Temporary disability	172.6 cases per 1000 men

Severity Rate

Deaths	10.5 days lost per man per year
Permanent injuries	2.5 days lost per man per year
Temporary injuries	2.1 days lost per man per year

Severity Rate by Departments and Years

	Days lost per man per year				
	1910	1911	1912	1913	1914
Blast furnaces	38.4	26.5	29.5	29.1	20.1
Steel works	35.7	19.7	30.8	20.8	14.9
Rolling mills	20.8	14.2	10.2	9.5	8.7
Entire plant	19.7	12.3	15.3	16.8	11.9

In blast furnaces the high rate is probably due, he said, to the dangerous work associated with casting in the cast house and the frequency of asphyxiations. The discussions of this paper by D. R. Kennedy, assistant to the president, Youngstown Sheet & Tube Co., Youngstown, Ohio, and L. W. Hatch, chief statistician, Department of Labor, State of New York, Albany, N. Y., indicated opposite points of view. Mr. Kennedy agreed with Dr. Chaney that units should be established for measuring the amount of accidents occurring in plants, so that data compiled at any place might be comparable with those compiled at other places, and emphasized that this was fundamental to further study of safety. Mr. Hatch pointed out that the Department of Labor, State of New York, was carrying on extensive work with a view to determining the direct causes of accidents on particular machines. He said that the department is willing to go as deeply into this problem as it thought necessary, and is willing to spend money and time with the expectation that the results obtained will justify the means.

Further discussions indicated that difficulties might be encountered in the analysis of data obtained by Mr. Hatch, the point made being that information reaching his office would not disclose the number of machines of any particular type in operation and, as accidents probably would be proportional to the number of machines operating, this precludes accuracy in the determination of causes of accidents. Mr. Kennedy believes that this method is too detailed for state work.

W. E. Watters, National Malleable Castings Co., Melrose Park, Ill., discussing the method of training and obtaining the co-operation of foundry foremen in safety work, stated that large organizations must get at the minds of their foremen to get co-operation. He divided foremen in two classes; those who are enthusiastic and interested in their work, and those who are of a dormant nature, sluggish and uninterested. In foremen he seeks five qualities of mind; appreciation, gratitude, faithfulness, co-operation and enthusiasm. He favors the use of rigid discipline to prevent recurrences of accidents and explained a system in which a jury of foremen determines the cause of accidents when they occur and provides for punishment of those responsible.

Paraffin for Treating Burns

S. W. Ashe, education and welfare department, General Electric Co., Pittsfield, Mass., explained that ambrine used for treating wounds and burns is a good grade of paraffin containing antiseptics, does not leave a scar and lessens the time required for proper healing 50 per cent.

Reducing Labor Turnover

F. W. Shepard, safety inspector, American Cast Iron Pipe Co., Birmingham, Ala., discussed how improvement in safety conditions reduces labor turnover and accidents. He estimated that the usual cost of training a new laborer is $45, and explained that in his plant men are trained before entering new work by a method of filling in when temporary vacancies occur in the work for which they are thought qualified.

The following means of reducing labor turnover were suggested as having proved efficient in his plant: A medical department including a dentist; a welfare committee extending its services to the families of the workmen; a Y. M. C. A.; a day school for the illiterate; an athletic field; a branch bank and a mutual aid benefit run by men who pay 10c. a week, whereas the company puts into this fund an amount equal to that given by the workmen. As a means of fostering a spirit of safety he suggested a plant paper publishing news as well as safety ideas and a motion picture show which, besides entertainment, would afford opportunity to visualize for the men safety ideas. The following results he credits to the use of these means in his plant:

The number of men employed has increased 30 per cent since 1912, when 930 men were employed. The number employed for one year or more has increased 170 per cent; the number of men losing not more than four days has increased 327 per cent; the number of men working every day has increased 455 per cent; and accidents have decreased 47 per cent.

D. R. Kennedy pointed out that the Youngstown Sheet & Tube Co. had a labor turnover in the last year of 187 per cent; 85 per cent of the men had been there less than six months; 11 per cent were men who rented and 4 per cent were home owners, and he paid particular stress to the latter feature. Considerable trouble, it appears, was experienced with men of the floater type, who come in groups with their own foremen and unless satisfied leave with their foremen. Regarding the question of the negro labor turnover, it was suggested that this problem could be handled by properly equipped club houses for negroes only, making them feel that they were receiving consideration.

John P. Eib, supervisor of safety and labor, Illinois Steel Co., Joliet, Ill., discussed the successful establishment of a lunchroom in the Joliet plant. Previous to the installation of the lunchroom, the men found it absolutely necessary to obtain their food either from the poor restaurants adjoining the plant or nearby saloons.

A paper given by S. W. Ashe on practical welfare work in foundries is reviewed elsewhere in this issue.

J. Claude Smith, safety director, Inland Steel Co., Indiana Harbor, Ind., presented a paper on the mechanical safeguarding of electric traveling cranes which was in fact a complete specification of crane requirements so far as safety regulation is concerned. He

pointed out that the purchasing agent is inclined to cut down costs and cut out safety devices, and so long as this is true it will be difficult to improve the design of cranes from a safety viewpoint.

Safety in Plant Yards

Dr. Chaney, discussing the paper by F. G. Bennett, safety director, Buckeye Steel Castings Co., Columbus, Ohio, on safety in yard practice, stated that while other departments in the steel plants had decreased accidents 30 to 35 per cent, the yards had only decreased these 3 per cent. He believes that this difference is due to the fact that inter-plant traffic is not brought up to the standard of the railroads as required by the Interstate Commerce Commission. Frank E. Morris, safety engineer, American Rolling Mill Co., Middletown, Ohio, discussing safe practices in sheet mills, pointed out that the great problem is transporting sheets, and that the danger lies in this part of the manufacture rather than in the rolling process. To obviate some of its hazards he said his company uses a steel frame on cranes which facilitates tying the sheets in bundles, also the men handling sheets use sheepskin gloves having the wool outside, and this prevents cuts on the forearm. Hand trucking, he said, is a dangerous method of transporting sheets. The discussion appeared to attach importance to the question of cramps. It was brought out that some form of cooling blast should be afforded the men working around the sheet rolls, and in this connection it appeared that either a blast through a 6-in. diameter pipe or slowly moving currents of air could be used, and that some companies found it preferable to use the slowly moving body of air as relieving to some extent the tendency to cramps.

Leslie M. Rice, district safety inspector, American Steel & Wire Co., Worcester, Mass., discussing open-hearth hazards suggested that stairways be provided under or over tracks in the yard of the open-hearth department. He laid stress on the importance of choosing a well-qualified man to operate cranes in the open-hearth department, and believes that this man should be thoroughly examined by both the electrical superintendent and the master mechanic. Considerable discussion centered around the point of a tap hole shield to protect men during the period of blowing out the furnace after tapping.

Protection in the Steel Department

Earl B. Morgan, safety engineering, Norton Co., Worcester, Mass., stated that he had experimented with a protective shield for the tap holes, but had found the design of this to be rather difficult. He also suggested the use of a bridge across the top of the furnace, so in case men found it necessary to go above the furnace they would not step on the arch. George T. Fonda, safety engineer, Bethlehem Steel Co., South Bethlehem, Pa., pointed out that in one case where a mold had not been properly cleaned and a butt remained in it the collection of gas when the molten metal was poured caused an explosion with considerable damage. In using a box ladle to pour ingots it was suggested as being desirable that steel shields be used on the pouring platform to protect the men working there, but considerable difficulty was found in designing this. This brought out information that a canopy forming a part of the roof of the pouring platform, extending across the first six ingot molds, proved satisfactory in one plant, a shield 2 ft. high being used on the floor at the first two molds.

J. S. Herbert, superintendent of the safety department, Cambria Steel Co., Johnstown, Pa., estimated that 93 per cent of the accidents had no mechanical connection and 73.9 per cent were up to the man himself from one cause or another, ignorance, carelessness, indifference or whatever the cause might be. He stated that a man employed in a steel mill under 30 days was 12 times as likely to be hurt as a man employed over 30 days. He considered it unnecessary to teach men all safety methods pertaining to a plant, as they have specific jobs to perform. He believes that a $1,200 a year foreman should produce $1,500 for the company, and if the accidents in his department run high, the compensation may obviate any profits and may cost the company from $3,000 to $5,000. J. M. Larkin, service department, Fore River Shipbuilding Co., Quincy, Mass., said that in his company accidents in departments are charged as overhead expense against the foreman. He found that the co-operation of the foreman in safety work can be obtained by consulting them on safety movements.

Electric Shock Resuscitation

Dr. C. A. Lauffer, medical department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., discussed the hazards of low voltage. The discussion of his paper indicated that when a man has been shocked by electricity resuscitation may sometimes be accomplished by striking the man's feet, pulling his hair or even dropping him to the ground and such infliction of pain was advocated in conjunction with the prone pressure methods of resuscitation.

L. L. Park, safety and apprentice supervisor, American Locomotive Co., Schenectady, N. Y., discussing new kinks in eye protection, pointed out that there is a large field for the development of a small portable screen which may be moved from one machine to another. These screens, he said, are frequently more desirable than goggles, and the men take more kindly to them. He emphasized the importance of designing goggles so that when broken glass will not fly into the eye of the man, and suggested aluminum frames to reduce their weight.

New Officers

The informal dinner held in the Hotel Astor Sept. 12 was well attended, about 800 persons being estimated as present. Officers for the ensuing year were announced as follows: President, David Van Schaack, Ætna Life Insurance Co., succeeding L. R. Palmer; first vice-president, S. W. Tener, American Steel & Wire Co., second vice-president, J. M. Eaton, Cadillac Motor Car Co.; and third vice-president W. L. Chandler, Dodge Mfg. Co., Mishawaka, Ind. General manager, secretary and treasurer, W. H. Cameron; assistant secretary, J. J. Lamont; field secretary, C. W. Price, and editor, E. R. Wright, were re-elected.

Large Contract for Forgings

The Tioga Steel & Iron Co., Philadelphia, a subsidiary of the Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has been awarded a contract by the Bureau of Ordnance, United States Navy, covering a heavy tonnage of rough-machined and heat-treated forgings for 4-in. naval guns. A forge shop and heat treating plant, 120 x 280 ft., and a machine shop, 90 x 240 ft., are in course of construction at the Tioga plant, Fifty-second Street and Grays Avenue, Philadelphia, and it is expected that these buildings will be ready for occupancy within 90 days. New equipment aggregating about $600,000 in value has been purchased. The forge and machine shop equipment ordered is very heavy and efficient in design and the heat treating department is to be modern in every particular.

The Taylor-Wharton Iron & Steel Co., the parent concern, and its predecessors have been engaged in business at High Bridge, N. J., for 175 years. They made cannon balls for the Revolutionary War and have furnished munitions for every war in which the United States has been engaged. The Taylor-Wharton Iron & Steel Co. is about to celebrate the anniversary of the first successful manufacture of manganese steel in America, which occurred at the High Bridge plant just 25 years ago.

The Government contract, it is announced, will not interfere with the regular business of the company.

The Reading Iron Co., Baer Building, Reading, Pa., manufacturer of iron and steel forgings, bar iron and steel, etc., has filed plans for the erection of a new rolling mill, about 70 x 290 ft., to cost about $25,000, exclusive of equipment. The company is also planning for the erection of a new puddle mill to cost about $10,000.

Iron and Steel Markets

EFFECT OF COAL PRICES

Lesson of Non-Deliveries at Set Figure

Contracting of Coke, Iron and Steel to Insure Delivery—Prices Secondary

The fuel situation has become more serious since the fixing of the $2 basis for bituminous coal and present and future effects upon the steel industry are giving no small concern. Eastern producers of plates and shapes have been facing a shutdown for the past ten days because of short shipments of gas coal, and it appears that the Government must actually get into the business of supplying coal to some iron and steel producers from whom it has bought material.

The fact that $2 coal is not coming out and that users whose contracts at higher prices are still in force are getting a supply indicates what will happen when a price is fixed on coke. Steel companies which buy blast furnace coke in the market may have to look to the Government to supply them with coke in order to be able to deliver Government steel.

Only recently blast furnaces were unwilling to enter into contracts for coke, expecting almost daily the announcement of the Government price. In the past week some furnaces which have sold pig iron through the first half of 1918 have contracted for coke at $8.50, some of these contracts running through all of 1918.

In connection with the allotment of 15,000 tons of Government coke among merchant coke operators for delivery over 12 months, it should be said that the prices of $3.50 for foundry and $3 for furnace were tentative and in the nature of advance payments. Final payment is to be paid after prices are fixed by the Government.

Dissatisfaction with present war buying methods grows and manufacturers who recently ceased to act on advisory committees in view of the legal questions raised are not likely to resume this relation. Sentiment is being made daily in favor of larger powers for the War Industries Board and the recognized need of further centralization may explain the delay in announcing iron and steel prices, though the impression in Washington is that the question will be settled this week.

It is becoming clearer that recent contracting at concessions from the lately firm levels is to fix with a certainty the supply of material. Consumers may believe that the quantities available at Government prices after Government needs, general contracts and spot demands are cared for will be small.

Certainly there is an increasing inclination to find prices which will bring takers. Last quarter contracts for steel bars at 3½c. at mill stand as an illustration; as do also a quotation of 7½c. on tank plates and of 7.75c. on round lots of black sheets. The reduced consumption of fabricated material shows to what an extent high prices have been a check. To reach the totals of 1915 and 1916 in bridge and building construction as much business would need to be done in the remainder of the year as was covered in the eight months passed.

The pig iron market is largely made by resale transactions, chiefly of iron intended for export, but there are evidences of weakening in furnace prices. In foundry iron the most marked recession is in connection with Eastern sales. In one case as low as $43 at furnace was done in a sale of No. 2 plain. Generally the market may be put at $2 below last week's level. Southern iron for this year can be had at $47 Birmingham for No. 2 and at $45 for 1918 delivery.

In basic iron the break is a reminder of the rapid advances of a few months ago. A Shenango Valley steel interest has sold 2000 tons from an accumulation for prompt shipment at $42 at furnace, against $48 ruling a week ago, and Southern basic has been bought in the Chicago market at $40, delivered, though the latter may be slightly off standard analysis iron. In the face of this, quotations as high as $50 are still made.

As iron and steel prices fall, the course of wages is upward and still upward, as the Pacific Coast shipyard strikes emphasize anew. A strike in Pittsburgh has forced the banking of six blast furnaces.

Consumers of Lake Superior ore will be fairly well supplied at the close of navigation, it now appears. The sub-committee of the Council of National Defense cut estimates of requirements and has established the amounts to be hauled meanwhile by the railroads.

Waiting for the move at Washington has had its effect on export buying where license difficulties are nil. Though inquiries are a-plenty they have earmarks of feelers, with questions as to makers' attitude on the contracts proposed in the event of price recessions.

A sale of 30,000 tons of basic iron for Italy is noted. Besides the 15,200 tons of plates for ships for Italy, 12,000 tons is wanted for France and 15,000 tons, probably for Australia. On 2000 tons of plates 10c. has been done.

The general price on lead has now touched the Government price of 8 cents, a reduction of 3 cents in as many weeks.

Pittsburgh

PITTSBURGH, Sept. 18 (*By Mail*).

The question of securing a full supply of coal and coke for operating steel mills and blast furnaces is now the most serious one that is before the trade. On Monday night, Sept. 17, the Pennsylvania Railroad declared a flat embargo against all shipments of coal over its own lines and leased lines for delivery west of Rochester, Pa. This has entirely cut out shipments of coal to the Mahoning and Shenango Valleys and also to all manufacturing plants located at places near the Valleys. Concerns that use by-products coal for their coke ovens are suffering greatly, and the embargo may result in the banking of a number of blast furnaces in the two Valleys, and also the shutting down of some

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 19, 1917.	Sept. 12, 1917.	Aug. 22, 1917.	Sept. 20, 1916.
No. 2 X, Philadelphia	*$50.00*	$52.00	$53.00	$19.50
No. 2, Valley furnace	*50.00*	52.00	53.00	18.50
No. 2 Southern, Cin'ti	49.90	49.90	49.90	17.40
No. 2, Birmingham, Ala.	47.00	47.00	47.00	14.50
No. 2, furnace, Chicago*	*54.00*	55.00	55.00	18.00
Basic, del'd, eastern Pa.	*48.00*	50.00	50.00	19.75
Basic, Valley furnace	*42.00*	48.00	52.00	18.25
Bessemer, Pittsburgh	*50.95*	51.95	53.95	22.20
Malleable Bess., Ch'go*	55.00	55.00	55.00	19.00
Gray forge, Pittsburgh	46.95	46.95	46.95	18.95
L. S. charcoal, Chicago	58.00	58.00	58.00	19.75

Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	38.00	38.00	38.00	33.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	35.00
Bess. billets, Pittsburgh	65.00	65.00	80.00	45.00
O.-h. billets, Pittsburgh	65.00	65.00	80.00	45.00
O.-h. sheet bars, P'gh	75.00	75.00	85.00	45.00
Forging billets, base, P'gh	100.00	100.00	115.00	69.00
O.-h. billets, Phila	*75.00*	85.00	90.00	48.00
Wire rods, Pittsburgh	90.00	90.00	90.00	55.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia	4.935	4.935	5.185	2.659
Iron bars, Pittsburgh	4.75	4.75	4.75	2.60
Iron bars, Chicago	4.50	4.50	4.50	2.35
Steel bars, Pittsburgh	4.00	4.00	4.00	2.60
Steel bars, New York	4.195	4.195	4.695	2.769
Tank plates, Pittsburgh	8.00	8.00	9.00	4.00
Tank plates, New York	8.195	8.195	10.195	4.169
Beams, etc., Pittsburgh	4.00	4.00	4.00	2.60
Beams, etc., New York	4.445	4.445	4.669	2.769
Steel hoops, Pittsburgh	5.75	5.75	5.75	3.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Sept. 19, 1917. Cents.	Sept. 12, 1917. Cents.	Aug. 22, 1917. Cents.	Sept. 20, 1916. Cents.
Sheets, black, No. 28, P'gh	8.50	8.50	8.50	2.90
Sheets, galv., No. 28, P'gh	*9.50*	10.00	10.00	4.15
Wire nails, Pittsburgh	4.00	4.00	4.00	2.60
Cut nails, Pittsburgh	4.65	4.65	4.65	2.60
Fence wire, base, P'gh	3.95	*3.95*	3.95	2.55
Barb wire, galv., P'gh	4.85	4.85	4.85	3.45

Old Material, Per Gross Ton:				
Iron rails, Chicago	$44.50	$44.50	$40.50	$19.25
Iron rails, Philadelphia	*$3.00*	45.00	45.00	20.00
Carwheels, Chicago	*32.50*	33.50	29.00	11.75
Carwheels, Philadelphia	32.00	32.00	34.00	15.50
Heavy steel scrap, P'gh	33.00	33.00	31.00	16.25
Heavy steel scrap, Phila	30.00	30.00	33.00	14.75
Heavy steel scrap, Ch'go	*31.00*	33.00	30.00	16.25
No. 1 cast, Pittsburgh	30.00	30.00	30.00	14.50
No. 1 cast, Philadelphia	*30.00*	32.00	33.00	16.00
No. 1 cast, Ch'go (net ton)	24.00	24.00	24.00	12.25
No. 1 RR. wrot, Phila	*$3.00*	45.00	45.00	20.00
No. 1 RR. wrot, Ch'go (net)	*34.00*	36.00	34.00	16.50

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	*$12.50*	$13.00	$15.00	$2.85
Furnace coke, future	*8.50*	10.00	10.00	2.75
Foundry coke, prompt	*13.50*	14.00	14.00	3.25
Foundry coke, future	*12.00*	12.50	12.50	3.50

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**26.25**	25.50	26.50	28.25
Electrolytic copper, N. Y.	**26.25**	25.50	26.50	28.50
Spelter, St. Louis	**8.12½**	8.00	8.50	9.50
Spelter, New York	**8.37½**	8.25	8.75	9.75
Lead, St. Louis	*7.87½*	9.50	10.50	6.85
Lead, New York	*8.00*	9.70	10.62½	7.00
Tin, New York	**61.75**	61.37½	61.75	38.50
Antimony (Asiatic), N. Y.	**15.00**	14.50	15.00	11.00
Tin plate, 100-lb. box, P'gh	$12.00	$12.00	$10.00	$5.75

of the steel plants, or at least only partial operations, until the embargo is removed. The Pittsburgh & Lake Erie Railroad, which also serves the two Valleys and adjacent districts with transportation of coal and coke, is still open, but the yards of this road at Glassport, Pa., and several other places are badly congested, and the movement of coal and coke over its lines is extremely slow. Conditions for doing business in steel and iron these days are very difficult. Buyers are afraid to buy anything and sellers are afraid to sell. In the matter of coke, all the coke operators believe the Government may shortly fix a price on blast furnace and foundry coke and some coke producers believe the price of blast furnace coke may be put as low as $4 per ton, but of course there is nothing official on this. For this reason, there has been a good deal of anxiety on the part of coke operators to sell their coke as far ahead as possible and as near as they can to the high prices ruling for prompt coke, with the result that in the past week or so there have been a number of contracts for blast furnace coke made at a flat price, and some on a sliding scale basis. It is not believed the Government, if it does fix the price on coke, will disturb any existing contracts. In the past week there has been more active inquiry in pig iron, steel and also for some forms of finished material, but when it comes to absolute sales there is usually a violent decline in prices, especially in pig iron and steel. In the meantime the whole market is waiting for the Government to fix its prices on steel, and present dull conditions are not likely to change until these prices come out. It is not believed anywhere now that the Government will attempt to fix prices on steel for general consumers, but will do so only for its own purchases, and probably for the Allies. It is not believed the prices the Government will fix will be as low as first expected. It is also the general opinion that just as soon as the Government prices are given out there will be a quick buying movement, as it is known that stocks have been running very low for some time. In fact, for nearly two months consumers have not been buying any material they could get along without, and in addition, jobbers have been working off stocks as fast as possible. It will take some little time for the market to adjust itself after the Government prices have been made known, but how much decline there may be in prices on steel products to general consumers will depend to a very great extent on what prices the Government gives out. The greatest activity in this market is in prompt furnace coke, for which there is a heavy demand at $12.50 to $13 per net ton at oven.

Pig Iron.—It would seem that the long expected break in prices of pig iron, notably basic, has come. For nearly two months there has been practically nothing done in sales of iron by furnaces to consumers, the only transactions having been in resale iron and at prices usually considerably lower than what were regarded as the market. Within a day or two there has been a sale of 2000 tons of basic iron by Shenango Valley steel interests at $42 per ton at furnace for prompt shipment. It seems the steel interest has 15,000 to 16,000 tons of basic iron on hand, and in view of the uncertainty of the market and the probability of lower prices ruling before long, the company decided to sell a part of this iron at the best prices it could get, and the sale noted above has been made. Several weeks ago there was a sale of 50,000 tons of basic iron at $48, at Valley furnace, noted in this report at the time, and this last sale is the only one of any importance that has since been made. The price represents a drop of $6 per ton, but this is really no more violent than the advances in prices on Bessemer and basic iron a few months ago, when it was no uncommon thing for prices on Bessemer and basic to be marked up in our reports in one week anywhere from $3 to $5 per ton. Whether the basic iron market has squarely declined to $42 per

ton is a question, but the sale and the price noted above are absolutely authentic. The Keystone Steel & Wire Co., Peoria, Ill., is in the market for 6000 tons of basic iron and as high as $50, Pittsburgh, has been quoted on the inquiry. A sale is also reported of 1200 tons of standard Bessemer iron, 300 tons per month over this year, at $50 Valley furnace. We also note small sales of No. 1 foundry iron at $52, and No. 2 at $50 to $51 Valley furnace. Reports are that a recent sale was made of 800 tons of No. 2 foundry iron at $43 at furnace, but this has not been confirmed. It is very evident that the tendency in prices of pig iron is strongly downward, but the market is very sensitive and is just as liable to advance as it is to decline. The Jones & Laughlin Steel Co. has a strike at its Eliza furnaces in this city, and four or five of these stacks are banked until the trouble is settled. If the strike should last any length of time, it might force this concern into the market to cover the iron lost in output by reason of the strike. There has been a considerable sale of No. 2 foundry iron for Government work at as low as $27.50 at furnace. A good deal of this iron is being shipped to shipyards on the Pacific Coast.

We now quote as follows: Standard Bessemer iron, $50; basic, $42; No. 2 foundry, $50 to $51; malleable Bessemer, $51 to $52; and gray forge, $46 to $47; all at Valley furnace. The freight rate for delivery in the Pittsburgh and Cleveland districts from Valley furnaces is 95c. per ton.

Billets and Sheet Bars.—The local steel market has been very quiet in the past week, no sales of moment in billets and sheet bars being reported. Negotiations are on for a considerable quantity of Bessemer and open-hearth sheet bars that may be put through before this week ends. Nearly all the sales of billets and sheet bars made recently were of resale steel, and were at prices considerably lower than would have been accepted by the mills. It develops that the English Government wants its shell steel as fast as contracts call for deliveries. The French Government is not urging the mills in this respect, but in fact is rather anxious that shipments be deferred to some extent, and this is being done by large steel mills in the Youngstown, Ohio, district that have contracts with France for shell steel made late last year and for delivery running over all of this year. We quote soft Bessemer and open-hearth billets at $65, Pittsburgh, and sheet bars and large slabs at $75 to $80, Pittsburgh. The decline in prices on sheet bars and large slabs has not been proportionately as large as in 4 x 4 billets. We quote forging billets at nominally $100 per ton, Pittsburgh, for ordinary sizes and carbons, but consumers are not buying, believing prices will be materially lower.

Ferroalloys.—The new demand for the various grades of alloys is quiet and prices are showing a downward tendency. While 80 per cent domestic ferromanganese is held at $400 per ton for prompt delivery, it is said there have been sales of carload lots recently at $375 or lower. We also note small sales of 50 per cent ferrosilicon at prices ranging from $160 to $200 per gross ton, for prompt delivery. We quote 80 per cent domestic ferromanganese for prompt shipment at $375 to $400 and for first half of 1918 delivery at $350 at furnace. We quote 18 to 22 per cent spiegeleisen at $80 to $82.50 per gross ton, delivered.

We quote 9 per cent Bessemer ferrosilicon at $89, 10 per cent $90, 11 per cent $95, 12 per cent $100, 13 per cent $105, 14 per cent $115, 15 per cent $125, and 16 per cent $135. We now quote 7 per cent silvery iron at $79 to $84, 8 per cent $80 to $85, 9 per cent $81 to $86, 10 per cent $82 to $87, 11 and 12 per cent $83 to $88. All f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having a uniform freight rate of $2 per gross ton for delivery in the Pittsburgh district.

Steel Rails.—The Carnegie Steel Co. has rolled and shipped 29,000 tons of 80-lb. rails, this being its portion of the recent Government order for France and the rails are now on their way to that country. There is practically no new buying in stardard sections or light rails and it is evident the consumers of light rails are looking for lower prices. Standard sections and light rails are quoted in detail on page 705.

Structural Material.—Very little new work is coming out in this district, but local fabricators are filled up for the remainder of this year or longer, and are not actively bidding on new work. The American Bridge Co. has taken 1600 tons for new steel buildings for the Lincoln Motor Co., at Detroit. This concern is erecting a new plant to build engines for aeroplanes. The American Bridge Co. is now shipping about 11,000 tons of fabricated material from its Western plants for the new Federal shipbuilding plant being built in Hackensack Meadows, N. J. It is expected that on Tuesday or Wednesday of this week the Government will place about 13,000 tons of steel for 32 buildings to be erected in France. Prices will be found on page 705.

Plates.—Compared with the great activity in the plate market less than 60 days ago, present conditions are extremely quiet. The Government embargo on plates for Japan and in fact for all other neutral countries has released a very large tonnage of plates which has reverted back to the mills, and now is available for domestic users. More prompt deliveries of plates can be had than at any time in a good many months. The Government is buying enormous quantities of plates for its programs, and it is said the two leading local plate mills are furnishing over 100,000 tons of sheared plates to it per month and the smaller mills are also furnishing considerable quantities. Prices on plates are undoubtedly easier, and we quote ¼ in. and heavier plates at 8c. to 9c. for delivery over the remainder of this year. Small lots from warehouse bring 11c. to 12c., prices depending on sizes, the quantity and delivery wanted.

Sheets.—About the only new buying in sheets of any moment is being done by the Government. The Navy Department placed last week among the different mills 11,000 tons of black and galvanized sheets, and the War Department placed 6800 tons of galvanized sheets, the leading interest taking half of the latter order. The supply of sheets for early shipment is larger than for some time. Some mills that some time ago stated they were pretty well filled up over remainder of this year are now actively seeking new business, and are making promise of fairly prompt deliveries. Mills that some time ago could get 9c. and 10c. and even higher for No. 28 Bessemer or open-hearth sheets now find they will have to reduce their prices considerably to get any new orders. It is believed that the quantity of sheets sold at the top prices quoted by some of the mills are very limited. We now quote Nos. 3 to 8 blue annealed sheets at 8c. to 8.50c., No. 28 Bessemer black, 8.50c. to 9c., and No. 28 galvanized, 9.50c. to 10c., f.o.b. Pittsburgh, in carloads and larger lots. Prices on smaller lots from warehouse are slightly higher. Prices on sheets are given in detail on page 705.

Tin Plate.—Nothing of interest developed in the tin plate trade in the past week. The output of the mills is restricted to some extent by shortage of labor and coal, and also by the disposition on the part of tin mill labor not to work more than three or four days per week. Rollers on hot tin mills, under the recent advance in wages, can earn $800 per month and more, and they are not inclined to put in a full week's work, being satisfied to earn less money and have more leisure time. The energies of the tin plate mills are still in the direction of producing a maximum output of bright plate this year for the packing of perishable foods, and it is believed there will be plenty turned out to meet the demand. There is an active export inquiry for tin plate, but this is being turned down by the mills, even at offered prices of $17 to $18 per base box, the mills not having the plate to spare. The new inquiry is light, small lots of primes from stock selling from $12 to $14 per base box, Pittsburgh. Prices on terne plate are given on page 705.

Hoops and Bands.—New buying is dull and is only for small lots for prompt shipment. Large consumers are covered over the remainder of this year, and specifications are fairly active. We quote steel hoops in small lots for prompt shipment at 5c. to 5.50c., and steel bands 5c. to 5.25c. at mill.

Wire Rods.—Makers report the new demand for wire rods as active, particularly for export to Canada, Japan and other countries. One lot of 1300 tons of soft wire rods was sold recently for shipment to Canada at $90 at mill. We also note a sale of 300 tons of high carbon rods to a domestic consumer at $110 at mill. Two local

makers of wire rods say their output for the remainder of this year is well sold up and they have very few more rods to spare. Prices on rods are given in detail on page 705.

Wire Products.—While the domestic demand for wire and wire nails is dull, export demand is heavy, and considerable sales of both nails and wire have been made at relatively higher prices. Recently there were sales of about 6000 kegs of wire nails for export, which netted the mills about $4.75 base, per keg, at mill. Also there have been sales of bright basic wire which netted the mills about $4.50 at mill. Local mills have lately taken nearly 7000 kegs of wire nails for the Government, the leading interest taking a like amount at $3.20 base, per keg. Independent mills are now operating largely on contracts for wire nails taken some time ago at $2.50 per keg, and on plain wire $3.55 per 100 lb. Prices on nails and wire of the independent mills, the American Steel & Wire Co. price being $16 per ton lower, are given on page 705.

Iron and Steel Bars.—There seems to be no doubt that prices on both iron and steel bars are easier, and consumers are getting better deliveries than for some time. As before noted, one large producer of steel bars has covered some of its trade for last quarter of this year at 3.50c. at mill, but other makers are quoting 4c. and 4.50c. at mill. Large consumers like the implement trade and car builders are specifying at a fairly active rate against contracts, and the Government has been a fairly heavy buyer of steel bars for war buildings that are being erected all over the country. The tonnage of steel bars used in each of these buildings is relatively small, but in the aggregate represents a considerable amount. The new demand for reinforcing bars is only fair, due to a general falling off in building operations. Mill prices in carloads and larger lots on iron and steel bars are given on page 705.

Shafting.—The domestic demand for shafting is dull, but the Government demand is heavy, and it has just placed an order for 600 tons with a local maker for use in various navy yards, the price to be fixed later. It is still reported that the Government is taking from 30 to 35 per cent of the entire output of shafting of all the makers, this going into shells, adaptors, nose pieces and for other uses. Two local makers recently opened their books for contracts for shafting for last quarter of this year delivery and have taken a fair number of orders. For the domestic trade, discounts on shafting remain at 10 and 5 per cent off list, small lots sometimes being sold at list.

Railroad Spikes and Track Bolts.—Domestic buying of railroad spikes and track bolts is dull, but the Government is a very heavy buyer and is in the market at present for several large quantities of spikes and still larger quantities of tie plates. The demand for boat spikes is very heavy, several of the leading makers conserving practically their entire output for the Government and it will very likely be needed. Prices on standard sizes of railroad spikes, while fairly firm at 7c., Pittsburgh, are being shaded at other places, notably in the Chicago district. Prices on railroad spikes and track bolts are given in detail on page 705.

Nuts and Bolts.—Makers report the domestic demand is quiet, and specifications are only fair. It is very evident that consumers of nuts and bolts are looking for lower prices in the very near future. The Government is a heavy buyer of nuts and bolts, and is said to be now distributing an order for about 20,000,000 bolts among the manufacturers. Discounts on nuts and bolts are unchanged and are given on page 705.

Cold Rolled Strip Steel.—The new demand is dull, but the Government is a fairly heavy buyer and has lately placed some large orders among the different makers. Makers are quoting for delivery to Oct. 31 only, except that in a few cases where urgency is shown they agree to accept orders for delivery over the remainder of this year. Specifications are fairly active, but in some cases shipments are being held, and so far few cancellations of contracts are reported.

On contracts, mills are quoting 9c. at mill, but on small current orders prices range from 10c. up to 12c. at mill. Terms at 30 days, less 2 per cent off for cash in 10 days when sold in quantities of 300 lb. or more.

Rivets.—New buying is quiet and specifications against contracts are only fairly active. It is evident that consumers of rivets look for lower prices in the near future and are not taking in any more rivets than they actually need.

Wrought Pipe.—The general demand for merchant iron and steel pipe is only fairly active, but mills are filled up for months ahead. The Government is still a heavy buyer, and lately placed about 700 tons of 2, 4, 6 and 8-in. pipe for railroad work in France, and also for heating the cantonments to be built in that country. So far, Government purchases of pipe have amounted to nearly 25,000 tons, divided among the different mills, the leading company having taken half or more of this quantity. Discounts on iron and steel pipe quoted by most of the independent mills, prices of the National Tube Co. being considerably lower, are given on page 705.

Boiler Tubes.—Mills are filled up on orders for iron and steel tubes for nearly a year, and are somewhat indifferent to the falling off in new demand that has developed lately. Prices are still very high, but are believed to have reached the crest and may be lower in the near future. The demand for oil country goods is enormously heavy, and premiums in prices are readily paid where the seller can promise fairly prompt delivery. On seamless steel tubing, the National Tube Co. is reported sold up for this year, and also for nearly all of next year. There are no regular prices on either iron or steel tubes, these depending entirely on the quantity, the sizes, and delivery. Nominal discounts, but which do not represent actual prices, are given on page 705.

Coke.—The expectation that the Government will shortly announce prices on furnace and foundry coke has resulted in some of the coke operators getting together with the blast furnaces and making contracts for blast furnace coke in various ways. One leading producer whose coke has a very high reputation in the trade has made several large contracts for blast furnace coke for all of 1918 delivery at the flat price of $8.50 per net ton, at oven. Two other producers have made contracts on a sliding scale basis, i. e., 5 tons of coke for the market price of one ton of basic iron, until basic iron declines to a certain price when the basis is 4½ to 1, and should basic iron reach a still other lower price, the basis is 4 to 1. The severe drop in basic iron this week to $42 per ton would mean that on a coke contract on a five to one basis the coke producer would receive $8.40 per ton for his coke, which is certainly a very high price. Another producer of blast furnace coke which always commands a little higher than the average market price is not favorable to making sliding scale contracts, but has agreed to sell its blast furnace coke for delivery starting Oct. 1 next and running through all of 1918 at $9 per net ton, at oven. Three or four blast furnaces operators that are now getting this coke, the price being fixed from day to day, are not agreeable to paying $9 per net ton, and it is possible this coke may go to other consumers, who seem willing to pay the price. Negotiations are still on for this coke, and will likely be concluded before this week ends. The railroad embargoes, shortage in coal and labor, and the heavy demand are all serving to keep up prices on blast furnace coke for prompt shipment which are ruling firm to-day (Tuesday) at $12.50 per net ton at oven. Sales of close to 100 cars are reported at this price. We now quote best make of blast furnace coke for prompt shipment at $12.50 to $13 per net ton at ovens and on contracts over the next six months to a year at $8.50 to $9 per net ton at oven. We quote 72-hr. foundry coke for prompt shipment at $13.50 to $14 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ending Sept. 8 as 355,987 tons, an increase over the previous week of 19,817 tons.

Old Material.—The local market on all kinds of scrap remains practically stagnant. The Pennsylvania Railroad now requires a permit before moving any cars loaded with scrap and must have assurance that the consumer will take the scrap in promptly when it is

received. The P. and L. R.R. will not load any cars with scrap until a permit is secured. It is said the loading consumers in this district may come in the market in a short time for a large tonnage of heavy melting steel scrap. If this proves to be the case, a better all around market is expected. Prices are purely nominal, and only a few carloads have been sold in this market for some weeks. In this condition there is nothing to do but repeat former prices:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	$33.00 to $34.00
No. 1 foundry cast	30.00 to 31.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	38.00 to 40.00
Hydraulic compressed sheet scrap	25.00 to 26.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mill, Pittsburgh district	23.00 to 24.00
Bundled sheet stamping scrap	21.00 to 22.00
No. 1 railroad malleable stock	26.00 to 27.00
Railroad grate bars	18.00 to 19.00
Low phosphorus melting stock	42.00 to 45.00
Iron car axles	45.00 to 46.00
Steel car axles	45.00 to 46.00
Locomotive axles, steel	52.00 to 53.00
No. 1 busheling scrap	24.00 to 25.00
Machine-shop turnings	21.00 to 22.00
Cast iron wheels	31.00 to 32.00
Rolled steel wheels	36.00 to 37.00
*Sheet bar crop ends	41.00 to 42.00
Cast iron borings	22.00 to 23.00
No. 1 railroad wrought scrap	32.00 to 33.00
Heavy steel axle turnings	23.00 to 24.00
Heavy breakable cast scrap	24.00 to 25.00

*Shipping point.

Chicago

CHICAGO, Sept. 17, 1917.

A lull of the most pronounced character has come over the entire market so far as domestic inquiry is concerned, but in the past few days export inquiries for steel products, including plates, shapes, bars and sheets have been numerous, the mail of to-day alone making known a large volume of such requirements, while previous days have been prolific. Little or no attempt is being made to care for the foreign demand for plates because of the export restriction, although the mills could easily load up with orders for this product subject to the raising of the embargo. It is pointed out that while domestic consumers are not inclined to take hold at present prices, the mills are declining not a little business at those very prices. Incidentally, it may be remarked that the export business is done at top quotations, and with no possible revision of prices, inasmuch as payment is made on presentation of shipping documents and credits are confirmed. France, Italy, Japan, India and South American countries are seeking material, with the mills favoring the Far East because of geographical reasons. Uncertainty as to Government action and the consequent future course of prices continues the dominating influence with domestic buyers. Though opinions differ, in the absence of official guidance, the majority of producers do not believe that the Government will attempt to say what private consumers shall pay for either iron or steel. By some sellers the view is held that the present lull is simply a contest in waiting between the consumers and the sellers, also that it is healthy inasmuch as the situation will clear up through the consumption of stocks of raw material, and that the outcome will be a good buying movement inside of 60 days, by which time the high peaks of prices will have disappeared. The producers of pig iron insist they are making no concessions in the small deals they are effecting, but resales at concessions continue, Southern No. 2 having sold at $45, Birmingham. More sales of plates at 8c., Pittsburgh, are recorded. The leading local independent will re-engage in the manufacture of galvanized sheets and expects to make shipments about Nov. 1.

Pig Iron.—Except in a few cases, buying has been confined to occasional carloads of resale iron. Furnace representatives state they are receiving very few inquiries, and what do appear call mostly for quick shipments of small lots. Inasmuch as they have more than they can do in filling their contract commitments, they declare they see no reason for granting concessions, and Northern No. 2 foundry iron is held at $55, furnace, for delivery into next year, with the Southern makers still asking $54, Chicago, for last half No. 2 soft, and $49, for the first half. In the week, 500 tons of malleable Bessemer, which was hurriedly wanted, was taken, it is reported, at the full price. Southern basic pig iron has been purchased in the Chicago market at near $40, delivered, but both seller and buyer assert that the iron exceeded standard analysis in sulphur. The heavy concession is construed as an evidence of weakness. While sellers assert they see no reason why the market should break, there can be no denial of the fact that a protracted period of dullness usually presages a decline in price, but against this it may be argued that these are peculiar times, and conditions are extraordinary both as to volume of contracts and troubles encountered in production. As to resale iron, there have been concessions granted by consumer-sellers of both Northern and Southern iron, and it is pointed out that a consumer who bought iron around $20 can well afford to sell his surplus under the prices quoted by first-hands. Resale Southern No. 2 has been let go at $49, Chicago, or $45, Birmingham. Some 2000 or 3000 tons of basic has changed hands at a figure below $55, Northern furnace, but it is declared that it ran 0.07 and over in sulphur, some of it being very bad. Inquiries for about 3000 tons of basic are still before the trade. Some of the resale iron offered, on the other hand, has brought the full price quoted by producers, and where the silicon or manganese was high, premiums have been paid. For 1000 tons of low phosphorus, close to $90 was the price. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 1 to 4	$58.00
Lake Superior charcoal, Nos. 5 and 6, Scotch and No. 1 soft or special	60.50
Northern coke foundry, No. 1	54.50
Northern coke foundry No. 2	54.00
Northern coke foundry No. 3	53.50
Northern high-phosphorus foundry	55.00
Southern coke No. 1 f'dry and 1 soft	55.00
Southern coke No. 2 f'dry and 2 soft	54.00
Malleable Bessemer	55.00
Basic	55.00
Low-phosphorus	$85.00 to 90.00
Silvery, 8 per cent	**77.50 to 82.50**

Ferroalloys.—In a quiet market, 80 per cent ferromanganese is a little easier at $375 to $400 for the remainder of this year, and $350 to $375 for the first half.

Plates.—More business in plates has been done at 8c., Pittsburgh, or 8.189c., Chicago, although one Eastern producer is still quoting 10c., Pittsburgh, and has done a little on that basis. A local mill has received orders from Washington for light plates wanted in the construction of destroyers, but the leading interest reports that it has received no very large orders from that source. Were the mills disposed to take plate orders subject to the granting of export licenses, they could pile up an overwhelming array of commitments, but transactions of this kind are regarded more as options than as actual contracts. Not only would they involve the mills in doubt as to where their output was to go, but should the licenses be granted, they would be swamped with specifications and demand that orders be filled at once.

For Chicago delivery out of stock, jobbers quote 10c.

Structural Material.—Shapes for domestic delivery in the remainder of this year have been purchased at 4.50c., Pittsburgh, or 4.689c., Chicago. For foreign shipment, there have been transactions at 4.50c. to 5c., Pittsburgh. From India, China, Japan and South America has come a large demand for structural sections, considerable of which has been cared for. Only one structural letting is reported—270 tons of steel frames for four box-car unloading machines, placed with the Moravia Construction Co. An Eastern mill continues to quote 6.189c., Chicago.

For material out of stock, jobbers quote 5c.

Bars.—Steel bars are in good demand for export,

the demand coming from Europe, as well as the Orient, but business with the Far East is the more attractive, and not so much, if any, attention, is being paid to that which emanates from Europe. The quotation of both Eastern and local makers is unchanged at 4.50c., Pittsburgh, or 4.689c., Chicago. Rail carbon bars range from 4.25c. to 4.50c., Chicago, depending on tonnage, delivery, etc. Consumers of hard bars show the hesitancy in buying common in all lines, and in the case of steel bars, one or two good inquiries for tonnages have been withdrawn. Iron bars range from 4.50c. to 5c., Chicago. Jobbers' quotations are unchanged.

We quote prices for Chicago delivery as follows: Soft steel bars, 4.50c.; bar iron, 4.50c. to 5c.; reinforcing bars, 4.50c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent to plus 10 per cent.

Sheets.—The leading independent in this territory announces its intention of reengaging on the manufacture of galvanized sheets, and will be ready to make shipments by Nov. 1. The price of galvanized ranges from 10c. to 10.25c., Pittsburgh, or 10.189c. to 10.439c., Chicago. Sheets are in heavy demand from abroad, while the Government continues to place orders, but nevertheless they have developed a little easiness in price. No. 10 blue annealed are quoted at 8.50c. to 8.75c., Pittsburgh, or 8.689c. to 8.939c., Chicago, and No. 28 black or box annealed at 8.75c. to 9c., Pittsburgh, or 8.939c. to 9.189c., Chicago.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 10c.; No. 28 black, 10c., and No. 28 galvanized, 11.50c.

Wire Products.—No change is reported, the leading producer adhering to its base of 3.20c. for nails, and to its general policy of carefully regulating the placement of its output. The independents still quote $4 for nails, on which base we quote per 100 lb. to jobbers.

Plain fence wire, Nos. 6 to 9, base, $4.189; wire nails, $4.189; painted barb wire, $4.339; galvanized barb wire, $5.039; polished staples, $4.339; galvanized staples, $5.039; all Chicago, carload lots.

Rails and Track Supplies.—Several inquiries from foreign countries, including South America, are under consideration by the mills, although the combined tonnage of these inquiries is not large. The quotation of the leading producer for spikes is 4.50c. to 5c., but other makers ask 5c. to 5.25c. In standard section rails there is a wide divergence in prices, small lots from stock being quoted from $60 to $90.

Standard railroad spikes, 4.50c. to 5.25c., base; small spikes, 4.75c. to 5.50c. base; track bolts with square nuts, 5.50c. to 6c., all in carloads, Chicago; tie plates, $70 to $90 f.o.b. mill, net ton; standard section Bessemer rails, Chicago, $38, base (nominal); open hearth, $40 (nominal); light rails, 25 to 45 lb., $70; 16 to 20 lb., $71; 12 lb., $72; 8 lb., $73; angle bars, 3.25c., base.

Bolts and Nuts.—The makers have plenty to do in filling the contracts on their books, but new business is practically at a standstill. For prices and freight rates, see finished iron and steel, f.o.b., Pittsburgh, page 705.

Store prices are as follows: Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to ⅞ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to ⅞ x 6 in., 40-2½; larger sizes, 30-5; hot pressed nuts, square, $2.50, and hexagon $2.50 off per 100 lb.; lag screws, 50 per cent off.

Cast-Iron Pipe.—St. Louis, on Sept. 21, will take bids on 1000 tons, this being the only municipal letting in prospect. A contractor is asking bids on 200 tons, but the general trade is extremely quiet.

Quotations per net ton, Chicago are as follows: Water pipe, 4 in., $68.50; 6 in. and larger, $65.50, with $1 extra for class A water pipe and gas pipe.

Old Material.—The week has been even more quiet than the preceding one, consumers buying, for the most part, only to cover urgent needs. While a number of items show declines, and the trend is toward lower levels, rerolling rails have firmed up a little, evidence of which lies in the purchase of 1000 tons at $41.50, a railroad being the seller. Uncertainty is still a marked feature of prices, for the reason that consumers adhere to their tendency to await Government action on prices of iron and steel products. The railroad offerings as a whole are small. A small list has been issued by the Atchison, Topeka & Sante Fe and one of moderate size by the Chicago & Eastern Illinois. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$44.50	to $45.00
Relaying rails	50.00	to 55.00
Old carwheels	32.50	to 33.50
Old steel rails, rerolling	41.00	to 42.00
Old steel rails, less than 3 ft	40.00	to 41.00
Heavy melting steel scrap	31.00	to 32.00
Frogs, switches and guards, cut apart	31.00	to 32.00
Shoveling steel	29.50	to 30.50
Steel axle turnings	23.00	to 24.00
	Per Net Ton	
Iron angles and splice bars	$40.00	to $41.00
Iron arch bars and transoms	43.00	to 44.00
Steel angle bars	31.00	to 32.00
Iron car axles	42.00	to 43.00
Steel car axles	41.00	to 42.00
No. 2 railroad wrought	32.00	to 33.00
No. 2 railroad wrought	32.00	to 33.00
Cut forge	31.00	to 32.00
Pipes and flues	22.00	to 23.00
No. 1 busheling	24.00	to 25.00
No. 2 busheling	17.00	to 18.00
Steel knuckles and couplers	37.00	to 38.00
Steel springs	40.00	to 41.00
No. 1 boilers, cut to sheets and rings	20.00	to 21.00
Boiler punchings	35.00	to 36.00
Locomotive tires, smooth	40.00	to 41.00
Machine-shop turnings	17.00	to 17.50
Cast borings	16.50	to 17.00
No. 1 cast scrap	24.00	to 25.00
Stove plate and light cast scrap	18.00	to 18.50
Grate bars	17.50	to 18.50
Brake shoes	19.00	to 19.50
Railroad malleable	31.00	to 32.00
Agricultural malleable	25.50	to 26.50
Country mixed scrap	18.00	to 19.00

Cleveland

CLEVELAND, Sept. 18.

Iron Ore.—Without having large surplus stocks it is expected that most consumers of Lake Superior ore will be fairly well supplied at the close of the season of navigation. Under the schedule of blast furnace requirements the amount of ore due the inland furnaces, exclusive of the Eastern consumers, in September, October and November is 12,506,370 gross tons, this amount being based on actual requirements up to June 1, 1918, and exclusive of ore handled at Conneaut. Estimates of requirements made by many consumers early in the season were materially cut by the subcommittee of the Council of National Defense. The railroads have been asked to move 40 per cent of the ore still due in September, 40 per cent in October and 20 per cent in November. It is probable, however, that consumers will have considerable of this ore placed on docks. For the entire season the interior furnaces will receive over 34,000,000 tons, the remainder going to Lake front and Eastern furnaces. It is expected that to meet the requirements of all consumers, a steady movement of the ore from docks will have to be kept up during the whole winter. We quote prices, delivered lower Lake ports, as follows: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.20.

Coke.—One producer who has been selling standard Connellsville foundry coke at $12.50 per net ton at oven is now sold out for the remainder of the year and has withdrawn from the market. Other makers are asking $13 to $13.50 for prompt shipment foundry coke. For the first half of next year standard Connellsville foundry coke is quoted at $10, at which price considerable business was booked during the week. Furnace coke is quoted at $12.50 to $13 for prompt shipment.

Finished Iron and Steel.—The demand for steel bars is more active than for some time and a fair volume of orders is being taken at 4.50c., Pittsburgh, for early delivery. There is an increase in inquiry for steel bar contracts for the first half, but mills are refusing to quote for that delivery. However, the price uncertainty is keeping many buyers out of the market. One Cleveland consumer inquired a few days ago for 1000 tons of billets per month for the first half, but after receiving quotations decided to defer buying. There is an increasing demand for steel for Government work and mills are finding it more difficult every day to supply the other demands of their trade. One new inquiry from the Government is for about sixty cranes, mostly locomotive cranes, which will require about 5000 tons

of bars, plates and shapes. The plate market is easier. While sales are reported as high as 10c., the more general quotations range from 8c. and 9c., Pittsburgh, for early delivery. The large plate mills are crowded with Government work and the low prices are being named by some of the smaller mills. The National Tube Co. is making plates for some of the Lake ship yards on one of its skelp mills. There is a good demand for steel rails for industrial companies and light rails for coal mines. Two inquiries from steel plants for about 1000 tons of 85-lb. rails for early delivery brought a quotation of $85. Two railroads have sounded the market on rails for 1918, but were told by the mill receiving the inquiry that it had no rails to offer for next year. The sale of one lot of light rails in 20-lb. sections is reported at $78, although most of the mills are asking considerably higher prices. One independent mill has covered its trade for fourth quarter contracts for Bessemer rods at $92.50, but on an export inquiry quoted $95. The sheet market is more active than it was for several previous weeks. Some business is coming from consumers who have been holding off for lower prices. Additional offerings of black sheets in round lots at 7.75c. at mill for No. 28 have been made to Cleveland steel barrel manufacturers, but this price is not being met by other producers. The usual quotations are 8.50c. for No. 28 black and No. 10 blue annealed, and 10.50c. for No. 28 galvanized. A new Government inquiry is for 500 tons of corrugated sheets either painted or galvanized for quick delivery. Prices on hard steel bars are easier, quotations ranging from 3.75c. to 4c. at mill. We quote bar iron at 4.25c. to 4.50c., Cleveland. Warehouse prices are unchanged at 4.50c. to 5c. for steel bars, 5c. to 5.25c. for structural material, 8.50c. for blue annealed sheets and 10.50c. for galvanized sheets.

Pig Iron.—The market continues inactive, sales being limited to a few small lots of foundry iron for prompt shipment. No Cleveland made iron is available for early shipment, but Valley iron is quoted at $52.75 to $53 for No. 2 delivered in this city for early shipment, and Virginia iron at $53.20. Both Northern and Southern furnaces are behind on shipments and are being crowded by consumers for deliveries. Some foundries are in actual need of iron, and others are trying to accumulate a reserve stock. Furnaces are now receiving actual orders for 16,000 tons of iron allotted by the Government several weeks ago for the Navy Department and Emergency Fleet. Some of this iron is wanted in about sixty days and a portion not until next spring. Steel making iron is quiet. A Cleveland interest is offering 1000 tons of Valley resale basic iron for prompt shipment, but so far has not found a consumer who wants the iron. A Pittsburgh broker is inquiring for 4000 tons of basic iron for delivery around the end of the year. Southern iron is quoted at $47 to $48 for prompt shipment, but can be bought at $45 for the first half. Silvery iron is easier and although no late sales are reported. an inquiry would probably bring out an $80 price. We quote, delivered Cleveland, as follows:

Bessemer	$50.95 to $52.95
Basic	48.95
Northern No. 2 foundry	52.75 to 53.00
Southern No. 2 foundry	49.00 to 54.00
Gray forge	48.95 to 50.95
Ohio silvery, 8 per cent silicon	81.62 to 86.62
Standard low phos. Valley furnace	85.00

Bolts, Nuts and Rivets.—The demand for bolts and nuts for Government work for motor trucks, wagons, airplanes and other equipment is very heavy and makers are getting further behind on deliveries of some lines. Prices are firm. New inquiry for rivets is not active, but specifications on contracts are very heavy. We quote rivets at 5.25c., Pittsburgh, for structural and 5.35c. for boiler rivets. Bolt and nut discounts are as follows, round lot buyers being allowed 5 to 10 per cent discount from these prices:

Common carriage bolts, ¾ x 6 in., smaller or shorter, rolled thread, 35 off; cut thread, 30 and 5, larger or longer, 20. Machine bolts, with h. p. nuts, ¾ x 4 in., smaller or shorter, rolled thread, 40; cut thread, 35; larger and longer, 25. Lag bolts, cone point, 40. Square h. p. nuts, blank, $1.90 off list; tapped, $1.70 off list. Hexagon, h. p. nuts, blank, $1.70 off; tapped, $1.50 off. C. p. c. and t. hexagon nuts, all sizes, blank, $1.25 off; tapped, $1 off. Cold pressed semi-finished hexagon nuts, 50 and 5 off.

Old Material.—The market, which has been very dull, has taken on a little life and a firmer tone has developed, due largely to some activity reported in the Pittsburgh district and to the expectation of a fall buying movement soon. Heavy melting steel is slightly higher and several other grades, including borings and turnings, have been marked up 50c. to $1 a ton. A Canton mill is reported to have purchased about 2000 tons of heavy melting steel at $34 and a western Pennsylvania consumer is inquiring for several thousand tons of turnings. Some inquiry is also coming from dealers for turnings. Relaying rails are bringing higher prices because of the scarcity of new rails. We quote prices, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$32.00 to $33.00
Steel rails, rerolling	44.50 to 45.50
Steel rails, under 3 ft	35.00 to 36.00
Iron rails	42.50 to 43.50
Steel car axles	50.00 to 51.00
Heavy melting steel	33.00 to 34.00
Carwheels	30.50 to 31.50
Relaying rails, 50 lb. and over	50.00 to 60.00
Agricultural malleable	24.50 to 25.00
Railroad malleable	32.00 to 33.00
Light bundled sheet scrap	24.00 to 25.00

Per Net Ton

Iron car axles	$46.50 to $47.00
Cast borings	18.50 to 19.00
Iron and steel turnings and drillings	18.00 to 18.50
No. 1 busheling	27.00 to 28.00
No. 1 railroad wrought	41.50 to 42.00
No. 1 cast	27.00 to 28.00
Railroad grate bars	22.00 to 23.00
Stove plate	21.00 to 22.00

Philadelphia

PHILADELPHIA, Sept. 18.

Coal troubles are still a conspicuous factor in the Philadelphia district. Virtually no soft coal at the $2 Government price is being sold. Mills that have contracts are specifying heavily, but the diversion of fuel to other points and the shortage of cars makes it possible for many plants to operate only on a day-to-day basis, with no telling when supplies of fuel may be exhausted. A plate mill in Eastern Pennsylvania has four furnaces ready to light, but has been obliged to delay doing so because of shortage of gas coal, and thereby output is being reduced. Repeated offerings of resale pig iron in this territory have had comparatively little effect upon prices quoted by the furnaces, but inquiry has been too light to offer a real test of what furnaces might be willing to do. Some blast furnaces have been persuaded that it is to their interest to contract ahead for furnace coke and several contracts for the first half of next year at $8.50, ovens, have been made. The coal situation is being pointed to as an example of what might happen in the coke trade following Government regulation of prices. It appears that furnaces which have sold their iron well ahead would rather be sure of a supply of coke at $8.50 than to take chances on getting a supply at the price the Government may dictate.

Pig Iron.—It is estimated that from 4000 to 5000 tons of resale foundry iron have been disposed of in this market within the past two weeks, largely in lots of one or two carloads. Prices have ranged from $2 to $4 under the lowest prices which furnaces have been willing to quote. Much of these offerings have been traced to an exporting house in New York which had a considerable tonnage under contract for export to Sweden when the embargo was declared. Some consumers are also re-selling. Although buyers have tried to use these resales to draw lower quotations from furnaces, they have been largely unsuccessful. The Eastern furnaces are in a favorable position, having sufficient tonnage on their books so that they can afford to sit tight and await the outcome of the present unsettled condition. Producers of iron are firm in their views and are not as greatly disturbed by the possibility of Government price-fixing as might be expected. Alabama No. 2 foundry iron is being offered for delivery in the first half of next year at $47, Birmingham. Eastern Pennsylvania No. 2 X foundry and Virginia No. 2 X foundry are to be had at $51, furnace, for prompt delivery, and possibly $50 could be done on a sizable order, but we have no knowledge of sales at the latter price. A sale of 1000 tons of Bessemer iron

for export at $54, delivered in New York, was made yesterday, but undoubtedly a lower price could be had on a domestic inquiry. A fair tonnage of 0.07 low phosphorus was also sold for export at $55, delivered, New York. There have been no other sales of importance. Prices are as follows for these standard brands, prompt delivery in buyers' yards:

Eastern Penna. No. 2 X foundry	$50.00 to $53.00
Eastern Penna. No. 2 plain	49.25 to 52.25
Virginia No. 2 X foundry	51.75 to 54.75
Virginia No. 2 plain	51.25 to 54.25
Basic	48.00 to 50.00
Standard low phosphorus	85.00 to 90.00

Coke.—Blast furnaces which have sold their iron for some time ahead show a disposition to place contracts for coke as they foresee a condition similar to that existing in the coal trade, if the Government fixes coke prices, where only those holding contracts can be sure of a supply. Several contracts for furnace coke for the first half of 1918 at $8.50, ovens, are reported. Spot furnace coke continues to sell at about $13, ovens. Spot foundry coke is $13 to $14, ovens, while $11 to $11.50 is quoted for delivery in the first half of next year.

Ferroalloys.—Ferromanganese is dull and weaker, with $375 now being quoted for prompt and $350 to $375 for fourth quarter and $350 for first half of 1918. Receipts of Brazilian manganese ore are said to be liberal. Spiegeleisen is now being quoted at $82.50, furnace.

Billets.—Several leading producers have no billets to offer, but because of low-priced offerings in Pittsburgh the market has weakened greatly, and $70 to $75, Pittsburgh, is now heard here for open-hearth and Bessemer rerolling billets, with forging billets about $10 higher.

Sheets.—Jobbers are placing very little business. Deliveries continue easy, with three to six weeks, and, in some instances, even better being quoted. Prices are weaker on the basis of 8.50c. for No. 10 blue annealed, 8.50c. to 9c. for No. 28 black and 10.50c. to 11c. for No. 28 galvanized, Pittsburgh, with quotations as low as 9.50c. to 10c. for galvanized being heard.

Structural Material.—Export licenses for ship shapes going to Japan are now being quite freely issued by the Government and several shipments have gone forward during the past week. A liberal tonnage of plain material for export to the Far East was sold a few days ago at 8c., Pittsburgh. Resale lots continue to appear at around 4.50c. The mill price is about 4.50c. to 5c., the lower price being on contract with shipments at mill convenience. The only domestic inquiry of importance is for 2500 tons for the new gun-forging plant of the Tacony Ordnance Corporation, Tacony, Pa., which will be awarded in a few days. The Stone & Webster Engineering Corporation, Boston and New York, is about to close for steel for 32 buildings to be erected for the United States Army in France, and which it is now estimated will require 425 tons each, or a total of 13,600 tons. Local fabricators have given estimates. Contracts for fabricating steel for 100 buildings to be erected by army engineers in France, each building requiring 110 tons, have nearly all been let. As mentioned last week, the Blaw Steel Construction Co., Pittsburgh, took a large share. Other companies receiving contracts include the Virginia Bridge & Iron Co., the Fort Pitt Bridge Works, the Lackawanna Bridge Co., and the King Bridge Co.

Plates.—Some mills are anxious for business, but are not willing to enter into competition with resellers whose offerings are made at prices varying from 7c. to 9c. One or two mills, which have little or no tonnage to offer, continue to quote the market for tank plates at 10c., base, Pittsburgh, but 9c. can be done for fairly prompt delivery and 8c. for fourth quarter. Several thousand tons have been sold for the last quarter by one producer at 8c. to 9c., Pittsburgh. A sale of 2000 tons of ship plates for shipment to Japan was made last week at 10c., Pittsburgh, the purchaser declaring that an export license had been granted. Despite the lack of definite information from Washington, the belief persists here that this Government will soon raise the embargo on shipments of plates to Japan. Inquiries for export are coming in almost daily. An inquiry received yesterday called for 13,000 tons of hull steel and 2000 tons of boiler steel wanted for shipment throughout 1918. The coal situation continues to be a disturbing factor. An eastern Pennsylvania plate mill has four furnaces ready to be lighted, which cannot be started on account of shortage of gas coal.

Iron and Steel Bars.—Sales of steel bars for prompt delivery have been made at 4.40c., Pittsburgh, with 4.50c. as the ruling quotation. Contracts for fourth quarter have been made at 4c. to 4.25c. Bar iron is unchanged at 4.75c. to 5c. and a fair business is being done.

Old Material.—Mills are buying very lightly and trading is confined largely to transactions between dealers. Prices per gross ton delivered in the Pennsylvania district are about as follows:

No. 1 heavy melting steel	$30.00 to $32.00
Steel rails, rerolling	41.00 to 43.00
Low phosphorus heavy melting	40.00 to 43.00
Old iron rails	43.00 to 45.00
Old carwheels	32.00 to 34.00
No. 1 railroad wrought	43.00 to 45.00
No. 1 forge fire	23.00 to 24.00
Bundled sheets	23.00 to 24.00
No. 2 busheling	16.00 to 17.00
Machine shop turnings (for blast furnace use)	17.00 to 19.00
Machine shop turnings (for rolling mill use)	20.00 to 21.00
Cast borings (for blast furnace use)	17.00 to 19.00
Cast borings (clean)	22.00 to 23.00
No. 1 cast	30.00 to 32.00
Grate bars	21.00 to 22.00
Stove plate	21.00 to 22.00
Railroad malleable	32.50 to 35.00
Wrought iron and soft steel pipes and tubes (new specifications)	30.00 to 32.00

Cincinnati

CINCINNATI, Sept. 18. (*By Wire.*)

More than the usual quantity of off iron has been made lately, due to the irregularity of furnace operations and the low grade coke furnished. The low prices prevailing for scrap make it somewhat difficult to dispose of this iron, but fortunately no important tonnage has yet been piled. Buyers are slower than they have been in covering even for nearby requirements, which is evidenced by their refusal to become interested in a few cars of consignment iron that were offered at attractive prices. The only inquiry out is from Michigan for foundry iron, for 500 tons for last quarter and first quarter shipment. The specifications indicate that Northern iron will be bought, if the order is placed. While there is very little iron in the Hanging Rock district for this year's shipment and no large tonnage for the first half, price reductions there are simply reflections from other Northern markets. To-day's quotations for this year now range from $53 to $54, Ironton, and for the first half all the way from $51 to $54. The Southern furnace price on No. 2 foundry is from $47 to $50 for this year and around $44 to $45 for the first half. Holders of resale iron seem to realize that any reduction in prices will not induce melters to contract now and they are holding close to the furnace figures. Offers are solicited, but without result. Virginia 2X is quoted at $51 furnace, but very few carloads have been sold in this vicinity lately. A typographical error in this report last week was responsible for the statement that a rate of Virginia iron was made at $45, whereas $51 was the price. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, for 1917 shipment, as follows:

Southern coke, No. 1 f'dry and 1 soft	$51.40 to $52.40
Southern coke, No. 2 f'dry and 2 soft	49.90 to 50.90
Southern coke, No. 3 foundry	49.40 to 50.40
Southern coke, No. 4 foundry	48.90 to 49.90
Southern gray forge	48.90 to 49.90
Ohio silvery, 8 per cent silicon	87.26 to 91.26
Southern Ohio coke, No. 1	54.76 to 55.76
Southern Ohio coke, No. 2	54.26 to 55.26
Southern Ohio coke, No. 3	53.76 to 54.76
Southern Ohio malleable Bessemer	54.26 to 55.26
Basic, Northern	54.26 to 55.26
Standard Southern charcoal	56.90 to 57.90

(*By Mail*)

Finished Material.—As a rule, the warehouses report business as keeping up fairly well, although new purchases are for limited amounts of structural material, cold rolled shafting, boiler tubes, sheets, etc. Ship-

ments from the mills are moving fast enough on all contracts to take the place of material shipped out. The nearby mills are quoting No. 28 black sheets at $8.65 and No. 28 galvanized at $10.65. These are the minimum prices named on any new business that is accepted. At the present time, new customers are not being sought and almost the entire mill outputs are employed to take care of old customers needs. We quote from warehouse stocks, iron and steel bars at 5c.; twisted steel bars, 5.05c.; plates ¼-in. and heavier, 10c. base; wire nails, $3.90 per keg and barb wire 5c. a lb. There is a very small demand for nails due to the curtailed building operations in the Central West.

Coke.—Late reports from reliable sources show that there is very little coke in the Wise County and Pocahontas fields that can be shipped this year. Some operators are said to have disposed of their outputs through the first half of next year. In the New River district, this condition exists, but in a more limited degree and there is still some foundry coke offered there for nearby shipment around $15 per net ton at oven. Connellsville 48-hr. coke for spot shipment is bringing all the way from $12 to $14 at oven and the average contract price per shipment next year is $10. On 72-hr. coke, the spot shipment price ranges from $13.50 to $14.50 and contract figures are from $10 to $12.50. These same figures are quoted in the Wise County and Pocahontas fields for what little coke there is to be obtained in those districts. The car supply has improved to a limited extent, but the labor shortage continues to be the chief obstacle in the way of obtaining anything like an average output.

Old Material.—Although there is still trouble in moving shipments east, local dealers have not used box cars for sending scrap to the rolling mills as has been done in other centers, realizing that scrap thus shipped would have to be unloaded by hand. There is very little demand for scrap of any kind and the foundries are buying only small quantities to carry them along from two to four weeks in advance. Heavy melting steel scrap has declined to $30 and steel rails for melting are also quoted at $30 per gross ton. The following are dealers' prices, f.o.b. cars southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$19.50 to $20.00
Old iron rails	33.50 to 34.00
Relaying rails, 50 lb. and up	45.50 to 46.00
Rerolling steel rails	36.00 to 36.50
Heavy melting steel scrap	30.00 to 30.50
Steel rails for melting	30.00 to 30.50
Old carwheels	29.00 to 29.50

Per Net Ton

No. 1 railroad wrought	$31.00 to $31.50
Cast borings	13.50 to 14.00
Steel turnings	13.50 to 14.00
Railroad cast	21.50 to 22.00
No. 1 machinery cast	25.00 to 25.50
Burnt scrap	14.50 to 15.00
Iron axles	44.00 to 44.50
Locomotive tires (smooth inside)	37.00 to 37.50
Pipes and flues	17.50 to 18.00
Malleable cast	22.50 to 23.00
Railroad tank and sheet	16.00 to 16.50

Birmingham

BIRMINGHAM, ALA., Sept. 18.

Pig Iron.—The Southern pig-iron market shows but little change, few sales being made, consumers apparently waiting until the Government has fixed a price in its control. The manufacturers are still behind in deliveries, production is a little off and the high quotations of the past several weeks are being maintained. Very little iron is to be offered from the probable make during the last three months of the year. There has been considerable iron sold also through the first half of 1918. Several of the larger consumers who placed orders in this district several months ago have sent representatives here again to urge deliveries, delays being troublesome. Inquiries being received again indicate a need for iron and intimation is given that if there should be some concessions, a good-sized tonnage might be placed. The accumulated stocks of pig iron show still further reduction this week, notwithstanding the reports of delays in deliveries. The quotations on iron are based on $50 for this year delivery on No. 2 foundry and basic, and $48 for next year's delivery. No reports are to be heard as to resale iron, though it is a fact that thousands of tons are still at various ports waiting transportation facilities for export. Pig iron quotations in the South are as follows:

No. 1 foundry and soft	$49.50 to $50.00
No. 2 foundry and soft	48.00 to 50.00
No. 3 foundry	47.50 to 48.00
No. 4 foundry	47.00 to 47.50
Gray forge	46.00 to 46.50
Charcoal	55.00 to 56.00
Basic	48.00 to 50.00

Old Material.—The old-material or scrap-iron and steel market in the South is weak and prices have declined a little as compared to last week. Consumers of heavy melting steel are offering under $21 50, and other scrap shows a deflection in price. Dealers report further increase in stock on hand. Quotations are as follows:

Old steel axles	$32.00 to $33.00
Old steel rails	24.00 to 25.00
No. 1 wrought	26.00 to 27.00
Heavy melting steel	20.50 to 21.50
No. 1 machinery	23.50 to 24.50
Car wheels	23.00 to 24.00
Tramcar wheels	20.00 to 21.00
Stove plate	18.00 to 19.00
Shop turnings	11.00 to 12.00

Coal and Coke.—Coal and coke production in Alabama shows improvement, as the labor agitation is at rest pending revision of prices for coal, f.o.b. at mines on the schedule given out by President Wilson at Washington. The United Mine Workers of America, Alabama district No. 20, is making efforts to induce the Government officials to recognize the protest of the Alabama operators against the prices fixed, and the hope is expressed that the miners will then be given some consideration. In the meantime there is to be no cessation of work by the union men. Every ton of coal and coke that can be produced is needed. The Woodward Iron Co. is drying out the 60 Wilputte by-product ovens at Woodward and will within the next three to four weeks be making coke and other by-products there. This plant will add considerably to the coke production by this company, not only supplying its own needs but giving much coke for the open markets. Producers of coke are unable to take on any new business now and will hardly be able to until next year. Quotations of coke are still around $12.50, foundry coke, and $8 to $10 on furnace coke, though contracts at almost half these prices are being worked on.

Pipe and Foundries.—The United States Cast Iron Pipe and Foundry Co. has piled up much pipe on the Argentine order and can get no transportation therefor, hence efforts are being transferred into other directions. Considerable iron is being melted by the above company, the American Cast Iron Pipe Co. and the National Cast Iron Pipe Co. Foundries are still laden with numerous orders for various products, Government orders in particular being numerous. Pipe prices still range between $60 and $63 for 6-in. and 4-in. sizes respectively.

St. Louis

ST. LOUIS, Sept. 17.

Pig Iron.—The interest in pig iron, aside from some special needs for small lots of analysis iron for immediate delivery has been rather slight, except for one inquiry for 1000 to 2000 tons of malleable for the last half of 1918 and 500 tons of No. 2 Southern foundry, in which latter case the inquiry was withdrawn after sounding out the market conditions. One call from an outside territory for 4000 tons of basic was presented to the local furnace, but it was not in position to consider the deliveries desired, although it is at present operating on basic iron. About 100 tons of ferromanganese was sold during the week at top prices and there was a considerable call for spiegeleisen for early delivery, about 400 tons being wanted. Quotations, despite the nominal condition of the market, were placed, largely as for the past several weeks, at $47 to $48 for deferred deliveries of No. 2 Southern foundry and $50 for spot or nearby delivery. Basic is held by the local

furnace at $55 per ton, though it can make only very deferred delivery.

Coke.—Very little was done during the week in foundry coke, only small lots being considered in the transactions closed, which were in the vicinity of $13 to $13.50, Connellsville, for the best selected 72-hr. On deferred deliveries there was some weakening of prices and the quotation was put at $10, Connellsville, for next year. The local by-product plant continues out of the market.

Finished Iron and Steel.—In finished products there was practically nothing being done so far as future contracts were concerned, and the consumers turned naturally to the warehouses to meet their immediate wants, particularly as deliveries on existing contracts are in an unsatisfactory condition. Mill representatives will not accept new business and are devoting all their attention to problems involved in material already contracted for and badly wanted by customers. Movement out of warehouse has been as active as ever with the demand exceeding the ability of warehouses to meet it as promptly as is desirable. For stock out of warehouse we quote as follows: Soft steel bars, 4.55c.; iron bars, 4.50c.; structural material, 5.05c.; tank plates, 10.05c.; No. 10 blue annealed sheets, 10.05c.; No. 28 black sheets, cold rolled, one pass, 10.35c.; No. 28 galvanized sheets, black sheet gage, 11.75c.

Old Material.—It continues to be a dealers' market in scrap and not much of a market at that as the dealers are unwilling to commit themselves either way and are awaiting the long expected Government action as to iron and steel prices which they are figuring will have a decided effect upon the quotations of their material. Dealers are trading a little among themselves to meet contract requirements, but are doing nothing other than this. Locally the rolling mills are taking very little and then only bargains as they appear. The steel mills are not in the market at all. The foundry grades are in very slight call. The Wabash list which closed last week went at fair prices to Chicago and Eastern interests, while the Union Pacific list went largely to Western interests. No new lists appeared this week. We quote dealers' prices f.o.b. customers' works, St. Louis industrial district as follows:

Per Gross Ton

Old iron rails	$40.25 to $40.75
Old steel rails, re-rolling	38.00 to 38.50
Old steel rails, less than 3 ft	37.00 to 38.00
Relaying rails, standard section, subject to inspection	50.00 to 55.00
Old car wheels	31.50 to 32.00
No. 1 railroad heavy melting steel scrap	30.50 to 31.00
Heavy shoveling steel	29.00 to 29.50
Ordinary shoveling steel	26.00 to 26.50
Frogs, switches and guards cut apart	30.50 to 31.00
Ordinary bundled sheet scrap	20.50 to 21.00
Heavy axle and tire turnings	20.00 to 21.00

Per Net Ton

Iron angle bars	$39.00 to $39.50
Steel angle bars	28.00 to 29.00
Iron car axles	44.50 to 45.50
Steel car axles	42.50 to 43.00
Wrought arch bars and transoms	41.50 to 42.00
No. 1 railroad wrought	35.50 to 36.00
No. 2 railroad wrought	33.50 to 34.00
Railroad springs	31.50 to 32.00
Steel couplers and knuckles	36.50 to 37.00
Locomotive tires, 42 in. and over, smooth inside	39.00 to 39.50
No. 1 dealers' forge	26.50 to 27.00
Cast iron borings	16.50 to 17.00
No. 1 busheling	25.00 to 25.50
No. 1 boilers, cut to sheets and rings	21.50 to 22.00
No. 1 railroad cast scrap	21.00 to 21.50
Stove plate and light cast scrap	16.00 to 16.50
Railroad malleable	29.00 to 30.00
Agricultural malleable	24.00 to 24.50
Pipes and flues	22.50 to 23.00
Heavy railroad sheet and tank scrap	18.00 to 18.50
Railroad grate bars	18.50 to 19.00
Machine shop turnings	17.50 to 18.00
Country mixed scrap	16.50 to 17.00

San Francisco

SAN FRANCISCO, Sept. 11.

There is not the same activity in the market here that prevailed a few weeks ago. War conditions have changed the local situation, and the trade, generally, is marking time only. None of the jobbers is placing any orders of consequence, waiting for events to develop, with a possible regulation of iron and steel prices by the Government. Some anxiety is felt over the general industrial unrest. It now looks as though the present car strike in San Francisco, which has lasted a month, is about to be made worse by a walk out of the iron trades' employees, supplemented by a strike in the shipyards. All these factors have contributed to a slacking of orders in most lines of the trade not subject to Government requisitions.

Bars.—Local mills are still announcing that, in consequence of the number of orders yet on file, they find themselves unable to contract for new business. Most of these orders are intended for export, as the local demand, on account of the doubtful aspect of the future, is less demonstrative than formerly. For some months, a strong demand has prevailed for twisted steel bars, used in the construction of concrete buildings, but the cessation in building has caused an easing off on orders. Jobbers and local mills quote a base price of 6.50c., on steel bars, out of stock, in small quantities, but the latter decline to quote on carload lots, except on specifications. Some independent Eastern mills, owing to a temporary surplus of certain sizes, are able to quote small rounds, not over 2-in. in carload lots, not less than 25 tons of a size, at 5.25c., which is under the local market.

Structural Materials.—With few public edifices going up and a halt in private building, there has been a considerable falling off in the placing of orders for structural materials. Needs are confined largely to requirements for odd work, rather than for building operations. In small quantities, quotations, out of merchant's stocks, are given at 7.75c, for 3-in. and larger, angles, channels and beams.

Plates.—Owing to the influence of the embargo, pronounced offers are arriving from Eastern mills, indicating that they can spare tonnage on plates for October shipment, and independent concerns offer deliveries on orders, in 30 to 60 days. Tank plates, out of merchants' stocks, are still quoted at 10.50c., but the situation is easier because of prompter shipments.

Sheets.—Although there is still a fairly active demand for some sizes, the demand lately has not kept up its former pace. The general feeling in the trade here is that the peak of the high prices of sheets has been reached, as indicated by the fact that the same level of prices has been maintained for several weeks, without an advance. However, with the Government's requisitions yet to be filled, the amount of which cannot be gaged, as no orders from the Government have been received, prices may advance when they arrive at the mills.

Wrought Pipe.—Deliveries of wrought pipe have not been so satisfactory as they have been in some other lines. Demand for most sizes continues brisk. Oil pipe for the oil fields is eagerly sought and a shortage of stocks makes it difficult to fill orders. Prices of wrought pipe remain unchanged, 4-in. black oil pipe being quoted at a base price of $96.25 per 100 ft.

Cast Iron Pipe.—For the present, few public works of a character requiring cast iron pipe are planned, and there are no gas or water works under construction that have not already contracted for their requirements. The largest contract offering to manufacturers of cast iron pipe comes from Santa Barbara, which city calls for bids on 100 tons. Quotations are given at $73 for 6-in. or larger, with gas pipe Class A, at $77, delivered here. Notification has been received that after Oct. 15 the railroad freight rate on cast iron pipe will be advanced $4 a ton.

Pig Iron.—Jobbers report that, in view of possible Government action in the matter of prices, buyers are holding off and refraining from making any contracts for pig iron. The halt in inquiries is so decided that there is, practically, no demand at all in this market, and buying will not reopen until something more definite is known of the Government's intentions.

Coke.—A more pronounced stringency in the coke market exists here and prices have advanced materially. As high as $30 a ton is asked, but buyers will not consider any purchases beyond their actual needs, at this time, on account of the uncertain outlook.

Old Materials.—Holders who had entertained very strong views regarding prices have now modified their demands somewhat. Finding that stocks did not move at prices asked, they have been letting go at more modest figures. Country scrap is now quoted at $23 to $25, and heavy melting at $30 to $33, but these figures are not firmly held to. The mining camps of Aurora and Bodie, besides many other smaller camps, have been stripped of the old machinery, much of which has been shipped to San Francisco. From 2000 to 3000 tons of this scrap has been taken out of the two camps. The Mono Lake and Bodie Railroad, long disused, has also been torn up and the steel rails and fish plates shipped to the war zone.

British Steel Market

Foundry and Hematite Iron Strong—Some Tin Plates Sold Below Official Price

LONDON, ENGLAND, Sept. 19—(*By Cable*).

Demand for Cleveland foundry pig iron is firm and broadening. Forge iron is somewhat easier, but hematite iron is strong. The tin plate market is generally firm, but concessions are being made for light plates below the official basis. American tin plates, double boxes, standard weight, are being offered at $35 f.o.b. New York. American semi-finished steel for November-December shipment is idle. Ferromanganese is nominal. We quote as follows:

Tin plates, coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, maximum, 30s.
Ferromanganese, £45 nominal.
Ferrosilicon, 50 per cent, c.i.f., £35 upward.
On other products control prices are as quoted in THE IRON AGE of July 19, p. 171.

Basic Iron Output Increased—American Semi-Finished Steel Unobtainable

(*By Mail*)

LONDON, ENGLAND, Aug. 28, 1917.—More activity has appeared in the second than in the first half of August when holidays restrained operations. Government control is still being extended in various directions at the expense of the merchant trade, whose overseas connections have been nearly obliterated with not much prospect of being reopened during the war. A fair amount of business is still proceeding to meet urgent Allied requirements arranged through Government departments or under close official control. Labor conditions are tight. There is certainly no relaxation of the intense firmness which has long prevailed, although there is an impression that the inflation of prices has about reached its apex, while the official maxima remain unchanged.

The additional steps taken to stimulate the production of basic iron seem to meet with a fair measure of success. Furnaces in the Midlands have been provided with the necessary accommodation and operations should improve shortly, while a widening of enterprise is contemplated in Staffordshire. Demand for Cleveland common iron has slackened, but considerable is being diverted to Scotland against August allotments, consumers' operations there being on a big scale in connection with shipbuilding. Exports to the Allies are being made as far as shipping tonnage will permit and old contracts are being worked off satisfactorily, but there is still an insatiable domestic demand for hematite while deliveries are closely supervised although output, which was temporarily weakened by furnace repairs should again increase soon. Inquiry from the Allies is persistent. There has been some interruption of iron-ore receipts through the labor troubles in Spain, but supplies are still coming so as to enable furnaces to secure enough material to protect their operations.

British semi-finished steel is unchanged, practically the whole output being allocated for essential Government contracts and official prices for Welsh bars as well as billets are retained at £10 7s 6d. The supply of discard material is being quickly absorbed at full prices, manufacturers being only too glad to utilize them, for there is no sign of relief in other directions and American material is virtually unobtainable. No offers of American billets have been made in spite of the reports of resales being attempted in America at reduced prices. The market for wire rods seems in a few hands with prices varying from £28 to £29 c.i.f. Liverpool, but demand is now slow, consumers being apparently well covered.

The latest advices available from the Midlands speak of a more lively demand for finished products, all descriptions being wanted in much larger amounts than can possibly be obtained. The mills have to face a flood of Government orders to which have first consideration and merchant business is more handicapped than ever. Bar makers seem booked to the end of the year. High premiums are being paid for early delivery of uncontrolled material such as iron and steel hoops and gas-strip.

Regulating the Tin-Plate Market

The tin-plate market has remained idle with business chiefly confined to "free" stock lots, selling up to 50s, usual basis, the concession for which will be entirely withdrawn Aug. 31, so that all sales will then be based on the official basis price of 30s net at makers' works against permits as fixed recently, whether for home trade or export. The official order giving all particulars of extras, allowances, etc., has at last been issued, the details being practically as anticipated. The delay in issuing this has held up business against permits for weeks past, and trading should now revive, although makers are already well sold up and not inclined to increase commitments inasmuch as some hope that the basis price may be raised a shilling or two. The official price is based on tin at £240, and an allowance either way has to be made at the rate of 1½d per box for each advance or decline of fully £5 a ton in tin. The strict regulations will probably entail much clerical work. There is a big Government inquiry for France and Italy.

As already advised by cable, the price of black sheets, basis No. 24, was about a week ago tentatively fixed at £17 10s net at makers' works, with allowances for other sizes, but there seems nothing definite regarding the control to be enforced, and business is largely held up for the present.

According to mail advices a commission has been appointed by the Queensland Government to make inquiries as to establishing an iron and steel plant there. The commission will inquire into the deposits of iron ore in Queensland, together with the deposits of limestone and fuel. It will also make inquiries as to the most suitable site and the cost of their erection. The Queensland Department of Mines is well furnished with reports on iron ore, as well as on limestone deposits in various parts of the State.

Buffalo

BUFFALO, Sept. 17.

Pig Iron.—Only a very small total of sales is reported for the week. Consumers are apparently not inclined to buy at present for next year's delivery, which is the only period for which the majority of furnaces have iron to sell. Another Government order of very moderate tonnage has been placed with one of the producers of the district. Aside from this, sales made have consisted almost entirely of small tonnages of resale iron which melters had on hand in excess of their requirements, and which they were able to dispose of at a price yielding them a good profit over the purchase cost. A little No. 2 X foundry has been sold at $53 and a little Malleable at $53 to $55, but the tonnage of sales has been really insignificant.

Price schedules are about the same as last week, and we quote as follows, f.o.b. furnace, Buffalo for 1918 delivery:

High silicon irons	$55.00 to $56.00
No. 1 foundry	54.00 to 55.00
No. 2 X foundry	53.00 to 55.00
No. 2 plain	52.00 to 54.00
No. 2 foundry	51.00 to 53.00
Gray forge	51.00 to 53.00
Malleable	53.00 to 55.00
Basic	54.00 to 55.00
Lake Superior charcoal, f.o.b. Buffalo	55.00 to 60.00

Finished Iron and Steel.—Specification from the general lines of trade for commercial uses remains light, but specifications are coming in more freely against Government contracts. The mills are still averse to taking on new obligations because of this increased Government demand. Prices for finished material remain unchanged at 4 to 4½c. for bars, 4¼ to 4½c. for structural shapes, 8c. for universal plates and 8 to 10c. for sheared plates. In cold rolled steel a little tonnage has been moved at a minimum of 10 off to the largest dealers, 5 off to the average dealer, with full list price for less than carload lots. Of the 11,000 tons of fabricated structural steel, for which the tonnage is to be distributed by the Government among a number of companies in this country for storage warehouses to be erected in France, 1500 tons has been awarded to the Lackawanna Bridge Co., Buffalo. A contract has also been awarded by the Government for 450 tons of steel sheets for roofing these storage warehouses, one-half of which went to a Buffalo producer.

Old Material.—Although the market shows more activity than reported a week ago, there has not been sufficient business transacted to thoroughly test prices. There is some disposition among dealers to believe that the schedule current for the past week or two would prove to be low in actual test; and that at the present tension any attempt to buy any considerable tonnages would mean a higher price level. Dealers are apparently not making much effort to dispose of material, except in cases where they find it necessary to move loaded material on track promptly. The embargo situation, which makes it necessary to secure a shipping permit for nearly every consignment prevents the free movement of material, and dealers are inclined to accept reduced figures on consignments to points that are obstructed by embargoes, and to provide outlet for material which otherwise would have to be unloaded into stock. Reports of the disposal of large tonnages of heavy melting steel and other scrap commodities in the Pittsburgh district during the past few days have had a tendency to check the downward trend in prices noted last week. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$31.50 to $32.00
Low phosphorus	41.00 to 42.00
No. 1 railroad wrought	43.00 to 44.00
No. 1 railroad and machinery cast	30.00 to 31.00
Iron axles	45.00 to 47.00
Steel axles	45.00 to 47.00
Carwheels	35.00 to 36.00
Railroad malleable	32.00 to 33.00
Machine shop turnings	18.00 to 19.00
Heavy axle turnings	26.00 to 27.00
Clean cast borings	20.00 to 21.00
Iron rails	43.00 to 44.00
Locomotive grate bars	20.00 to 21.00
Stove plate	21.00 to 22.00
Wrought pipe	28.00 to 29.00
No. 1 busheling scrap	28.00 to 29.00
No. 2 busheling scrap	18.00 to 19.00
Bundled sheet stamping scrap	20.00 to 21.00

New York

NEW YORK, Sept. 19.

Pig Iron.—Last week the lowest price reported on eastern Pennsylvania No. 2 X was $47, furnace, but it has since developed that a sale of No. 3 foundry pig iron was made recently at $45, furnace, and that last week a sale of 800 tons of No. 2 plain was made for delivery to a New Jersey machinery company's foundry at $43.50, delivered, or about $43, furnace. Other sales have been made, however, at higher prices and buyers insist that the market is not weak. Some sales of resale iron have been made at concessions, but furnaces for the most part are not willing to sell at less than $50, furnace, for No. 2 foundry, and some are holding for considerably higher. The American Locomotive Co. is in the market for 500 tons of basic, high phosphorus and No. 3. The railroad situation seems to be somewhat improved at present, but the supply of cars is still limited and sellers expect that, with the return of winter, troubles will multiply. The coke situation is highly unsatisfactory and furnaces are having trouble in getting enough to keep in operation. We quote for tidewater delivery in the near future as follows:

No. 1 foundry	$45.75 to $50.75
No. 2 X	44.75 to 49.75
No. 2 plain	43.75 to 45.75
Southern No. 1 foundry	50.75 to 51.75
Southern No. 2 foundry and soft	50.25 to 51.25

Ferroalloys.—Quotations for domestic ferromanganese, 80 per cent, are somewhat easier. For prompt or last quarter delivery, $375 is being asked and for delivery in 1918, $350 is the prevailing quotation. It develops that higher quotations, put out soon after the liberal sales made about six weeks ago, were not established, the result being the foregoing levels. Inquiries at present are few and sales are negligible, consumers in general being apparently well provided for, despite the fact that deliveries on British contracts are considerably in arrears. Receipts in September are proceeding at a comfortable rate compared with July or August, and promise to exceed either one of those months. It is interesting to note that Government official statistics for July, just issued, show that exports of ferromanganese in that month were 628 tons, this being the first time that data for this particular product have been separately given. A sale of fair size for export is reported. The 4000 tons of high-grade spiegeleisen, referred to last week as before the market, is reported to have been purchasd by a Middle Western consumer at a price understood to be $80, furnace, for delivery this year. The market is quiet at $80 to $82.50, furnace, for this year's delivery. The market for 50 per cent ferrosilicon is inactive and about $200, delivered, is asked for material wanted this year and $140 to $175 for delivery in 1918.

Old Material.—While the market is still very dull, heavy melting steel shows a slight increase in activity, with a little higher price generally prevailing. There is a feeling, however, that before business increases to any considerable extent, lower quotations will be made. Brokers quote buying prices as follows to local producers and dealers, per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania)	$28.00 to $28.50
Old steel rails (short lengths) or equivalent heavy steel scrap	28.00 to 29.00
Relaying rails	63.00 to 65.00
Rerolling rails	37.00 to 38.00
Iron and steel car axles	43.00 to 44.00
No. 1 railroad wrought	39.00 to 40.00
Wrought-iron track scrap	30.00 to 31.00
No. 1 yard wrought long	30.00 to 31.00
Light iron	8.00 to 10.00
Cast borings (clean)	19.00 to 20.00
Machine-shop turnings	16.00 to 17.00
Mixed borings and turnings	15.00 to 16.00
Wrought-iron pipe (1 in. minimum diameter, not under 2 ft. long)	28.00 to 30.00

For cast-iron scrap, dealers in New York City and Brooklyn are quoting as follows to local foundries per gross ton:

No. 1 machinery cast	$30.00 to $31.00
No. 1 heavy cast (column, building material, etc.)	26.00 to 27.00
No. 2 cast (radiators, cast boilers, etc.)	26.00 to 28.00
Stove plate	18.00 to 19.00
Locomotive grate bars	18.00 to 19.00
Old carwheels	31.00 to 33.00
Malleable cast (railroad)	30.00 to 31.00

Cast Iron Pipe.—The Government has failed to a large extent in its effort to obtain other pipe for use in the cantonments in the different parts of the country and has used a much larger tonnage of cast-iron pipe than was expected. The result is that stocks of cast-iron pipe shops have been almost completely cleaned up. Owing to this fact and also to the fact that the shops have orders on hand which will keep them busy for about three months, conditions are satisfactory, although present demand is very light and no business of importance is in sight. The only municipal tonnage of any consequence pending is 300 tons for Jersey City, N. J. Carload lots of 6 and 8-in. and heavier are quoted at $65.50 per net ton, tidewater, and 4-in. at $68.50.

Structural Material.—The dullness which has been prevailing is indicated by the report of the Bridge Builders and Structural Society that only 38 per cent of the country's fabricating capacity was put under contract in August. So flat has the building situation

become locally that a meeting has been called in New York, Sept. 20, at 3 p. m., at the quarters of the president of Manhattan Borough, to "discuss with building investors and bankers ways and means of stimulating building construction in this city." Calls to the trade for the meeting have been issued by C. J. Curtin, Woolworth Building, in behalf of the Building Material Exchange of New York. No plain material transactions at less than 4.25c., Pittsburgh, are noted, though it is admitted that an attractive lot might be done at 4c., Pittsburgh. Fabricators were called to a meeting in Washington on Tuesday to settle the distribution of contracts for the 32 buildings of approximately 500 tons each for France. The distribution of the 100 buildings of 100 tons steel each seems not definitely settled, but those mentioned as getting five to ten buildings each include the King Bridge Co., the Lackawanna Bridge Co., the Virginia Bridge & Iron Co. and Milliken Brothers, Inc. Other new work, is as usual, largely for the Government or growing out of Government needs, but one new proposition, the first of its kind in some weeks, is for an addition for the Oppenheim-Collins store in Brooklyn, of 700 tons. Another sizeable project on which bids will be taken Sept. 28 is for Penn Treaty Pier 57, Philadelphia. For an ordnance plant at Tacony, Philadelphia, 2000 tons will be required, and the following covers the remainder of new large work: 1400 tons for the Watertown Arsenal; 250 tons for the Navy for storing models at Washington; 400 tons for the Penn Seaboard Corporation, Chester, Pa., and 200 tons for a power house for the Niles-Bement-Pond Co., Plainfield, N. J. For the Culver Line elevated road, Brooklyn, some 3800 tons will again be before the market, the bid received some months ago having finally been rejected. We quote mill shipments at 4.445c. to 5.195c., New York, while from warehouses shipments are made at 5c. to 5.50c. per lb., New York.

Steel Plates.—Sizeable inquiries continue for export, but no business is consummated, chiefly because of the impossibility apparently of getting licenses. Added to the 15,200 tons for ships for Italy, mentioned last week, may be noted 13,000 tons of hull plates and 2000 tons of boiler plates for Japan, to be taken over the remainder of this year and through 1918, and 12,000 tons for France for delivery over the first half. If deliveries could be arranged for, the supply of plates is forthcoming. It is interesting to note that one inquiry asks particularly for the mill's stand in the event of price recessions. While 8c., Pittsburgh, is regarded as minimum, a quotation of 7.50c., Pittsburgh, has been made on tank quality for export, with the transaction still open. One mill has under consideration a proposition to roll 5000 tons of slabs into plates at $20 for the conversion with 20 per cent rolling allowance, or in other words, to deliver 4500 tons of finished product from 5000 tons of semi-finished material. We quote plates from mill at 8.195c. and higher, New York, and out of store at 8c. and higher.

Iron and Steel Bars.—Business is flat, and while there are considerable export steel bar inquiries, they seem to be feelers and to indicate that exporters are taking the attitude of the domestic users to hold off as long as possible before purchasing. Contracting for iron bars is not being pushed ahead as fast as expected, and there are signs that deliveries on bar iron and bar iron products will shortly be easier, though no price changes are noted, owing to the absence of business in volume. With some mills steel bar deliveries show little improvement, some of these covering commitments under relatively low-priced contracts. We quote steel bars from mills over the rest of this year at 4.195c. to 4.695c., New York, and iron bars at 4.945c. From New York district warehouses steel and iron bars are sold at 5c. to 5.50c.

Steel Rails.—Numerous small lots for industrial plants continue to move and a price of $70 per ton for standard sections which obtained not long ago is now generally about $85 per ton, and as high as 5c. per lb. has been paid for rails cut to short lengths.

IRON AND INDUSTRIAL STOCKS

Preparing to Meet War Demands Has Depressing Effect

The stock market was not very active last week and the general tendency was downward. It is evident that preparations for meeting heavy demands for war financing are continuing and are having a decided effect on speculation in holding it down to a low point. Some stocks that are regarded as in the safe class are selling as low or lower than they did in the panic of 1907 and the depression is not confined to shares which are speculative in character. Standard railroad and other corporation bonds have felt the effect of the depression as much as stocks. Week before last 73 new low records were made in prices of bonds and last week 87 made new low records. The injurious effects of the new taxes are being thoroughly discounted.

Among the stocks that registered gains during the week were the following: American Car & Foundry, 1⅝; Baldwin Locomotive, ⅜; Baldwin Locomotive, pref., ½; Bethlehem Steel, 3¼; Bethlehem Steel, Class B t.cfs., 1½; Crucible Steel, ¼; International Harvester, N. J., 2; Lackawanna Steel, ¾; U. S. Steel, pref., ⅛. Among the stocks that made losses during the week were the following: American Locomotive, pref., 1⅜; American Steel Foundries, 1½; Bethlehem Steel, pref., 2; Midvale Steel, ⅞; Pressed Steel Car, 2; Republic Iron & Steel, ⅝; U. S. Steel, ⅝.

Allis-Chal., com.	22 - 24¼	Int. Har. of N. J., com.	109 -112½
Allis-Chal., pref.	81½	Int. Har. Corp., com.	71 - 73½
Am. Can, com.	39 - 42¾	Lacka. Steel	77½- 82
Am. Can, pref.	102 -108½	Lake Sup. Corp.	15½- 16½
Am. Car & Fdy., com.	67½- 73	Lukens, 1st pref.	102
Am. Car & Fdy., pref.	108 -112	Midvale Steel	47½- 53¼
Am. Loco., com.	58¼- 61	Nat.-Acme	32 - 33
Am. Loco., pref.	101 -101½	Nat. En. & Stm., com.	37½- 40½
Am. Rad., com.	298	N. Y. Air Brake.	118 -123
Am. Ship com.	89 - 90½	Nova. Scotia Stl.	91½- 95¼
Am. Stl. Fdries.	63½- 66	Pitts. Steel, pref.	97⅛- 99¾
Bald. Loco., com.	55½- 60½	Pressed Stl., com.	60 - 62½
Bald. Loco., pref.	100	Pressed Stl., pref.	99⅞-101
Beth. Steel, com.	93 -105½	Ry. Steel Spring, com.	45 - 47½
Beth Steel, class B	90¼-104½	Ry. Steel Spring, pref.	98⅜
Beth. Steel, pref.	95⅛- 99	Republic, com.	76⅝- 81⅝
Case (J. I.), pref.	80¼	Republic, pref.	101½
Cent. Fdry., com.	25½- 27	Sloss, com.	42 - 46
Cent. Fdry., pref.	45	Superior Steel	38 - 39½
Chic. Pneu. Tool	60⅛- 61	Transue-Williams	40¼
Colo. Fuel	42¼- 44½	Un. Alloy Steel	42 - 43
Cruc. Steel, com.	65½- 70⅞	U. S. Pipe, com.	16 - 16½
Cruc. Steel, pref.	98	U. S. Pipe, pref.	50 - 51
Gen. Electric	135¼-139⅞	U. S. Steel, com.	103¾-105
Gt. No. Ore Cert.	32 - 33¾	U. S. Steel, pref.	115½-116⅝
Gulf States Steel	92½-101½	Va. I. C. & Coke.	54⅞- 58
Gulf States Steel, 1st pref.	105	Westing. Elec.	43½- 4

Dividends

The American Brake Shoe & Foundry Co., quarterly, 1¾ per cent on the common, 2 per cent and extra 1 per cent on the preferred, all payable Sept. 29.

The Emp're Steel & Iron Co., quarterly, 1½ per cent on the preferred, payable Oct. 1.

The International Harvester Co., of New Jersey, 1¼ per cent on the common, payable Oct. 15.

The Standard Screw Co., quarterly, 6 per cent, payable Oct. 1.

The Trumbull Steel Co., quarterly, 1½ per cent on the common and 1¾ per cent on the preferred, payable Oct. 1.

The United Shoe Machinery Co., quarterly, 50c. on the common and 37½c. per share on the preferred, payable Oct. 5.

The Willys-Overland Co., quarterly, 1¾ per cent on the preferred, payable Oct. 1.

The Yale & Towne Mfg. Co., quarterly, 2½ per cent, payable Oct. 1.

The Youngstown Sheet & Tube Co., quarterly, 2 per cent and extra 3 per cent on the common, and quarterly 1¾ per cent on the preferred, all payable Oct. 1.

The Metal Products Corporation, Providence, R. I., has gone into the hands of a receiver upon application of Harry M. Mays, Warwick, who holds a majority of the stock. Common stock amounting to $175,000 is outstanding and the attorney for the petitioner stated that creditors would probably be paid in full.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Denver pipe, 76.1c.; minimum carload, 46,000 lb.; structural steel and steel bars, 76.1c., minimum carload, 40,000 lb.; Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 60,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in., angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 4.00c.

Wire Products

(Prices of independent mills)

Wire nails, $4 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire, $4.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.95; galvanized wire, $4.65; galvanized barb wire and fence staples, $4.85; painted barb wire, $4.15; polished fence staples, $4.15; cement-coated nails, $3.90 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 43 per cent off list for carload lots, 42 per cent off for 1000-rod lots, and 41 per cent off for small lots, f.o.b. Pittsburgh.

Nuts and Bolts

Discounts in effect for large buyers are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 40 per cent, small cut thread, 35 and 2½ per cent; large, 25 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 per cent; large, 30 per cent.

Machine bolts, c. p. c. and t. nuts, small, 30 per cent; large, 20 per cent. Bolt ends, h. p. nuts, 30 per cent with c. p. nuts, 20 per cent. Lag screws (cone or gimlet point), 45 per cent.

Nuts, h. p. sq. blank, $2.10 off list, and tapped, $1.90 off; hex., blank, $1.90 off, and tapped, $1.70 off; nuts, c. p. c. and t. sq. blank $1.70 off; and tapped, $1.50 off; hex. blank, $1.60 off, and tapped, $1.40 off. Semi-finished hex. nuts, 50 and 10 per cent. Finished and case-hardened nuts, 50 and 10 per cent.

Rivets 7/16 in. in diameter and smaller, 40 per cent.

Wire Rods

Soft Bessemer and open-hearth rods to domestic consumers at $90 to $95; high-carbon rods made from ordinary open-hearth steel $95 to $100, and special steel rods with carbons running from 0.40 to 0.60, $100 to $110 at mill; above 0.60 carbon, $115 to $120.

Railroad Spikes and Track Bolts

Railroad spikes 9/16 in. and larger, $7.00; ⅝ in., 7/16 in. and ½ in., $7.00 base. Boat spikes are occasionally quoted $7.00 to $8.00, all per 100 lb., f.o.b. Pittsburgh, but some makers are quoting higher. Track bolts with square nuts, 7c. to 7.50c. to railroads, and 8c. to 8.50c., in small lots, for fairly prompt shipment.

Steel Rails

Angle bars at 3.50c. to 3.75c. at mill, when sold in connection with orders for standard section rails, and on carload and smaller lots, 4c. to 4.25c. at mill. Light rails, 25 to 45 lb., $75 to $80; 16 to 20 lb., $80 to $81; 12 and 14 lb., $82 to $83; 8 and 10 lb., $83 to $84; in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard Bessemer rails, $38; open-hearth, $40, per gross ton, Pittsburgh.

Tin Plate

Effective July 31, prices on all sizes of terne plate were advanced from $2 to $2.50 per package and are now as follows: 8-lb. coating, 200 lb., $16 per package; 8-lb. coating, I. C., $16.30; 12-lb. coating, I. C., $17.50; 15-lb. coating, I. C., $18.25; 20-lb. coating, I. C., $19; 25-lb. coating, I. C., $20; 30-lb. coating, I. C., $21; 35-lb. coating, I. C., $22; 40-lb. coating, I. C., $23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 4c. to 4.50c. for delivery late this year, and 4.50c. to 5c. from warehouse, in small lots for prompt shipment. Refined iron bars, 4.75c.; railroad test bars, 5.25c. in carload and larger lots f.o.b. mill.

Wrought Pipe

The following discounts on steel are to jobbers for carload lots on the Pittsburgh basing card in effect from May 1, 1917, all full weight, except for LaBelle Iron Works and Wheeling Steel & Iron Co., which quote higher prices, and National Tube Co, which adheres to card of April 1.

Steel			Iron		
	Butt Weld				
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	42	15½	⅛ and ¼	23	+4
½	46	31½	⅜	24	+3
¾ to 3	49	35½	½	28	10
			¾ to 1½	33	17
	Lap Weld				
2	42	29½	2	26	12
2½ to 6	45	32½	2½ to 6	28	15
7 to 12	42	28½	7 to 12	25	12
13 and 14	32½	..			
15	30	..			
	Butt Weld, extra strong, plain ends				
⅛, ¼ and ⅜	38	20½	⅛, ¼ and ⅜	22	5
½	43	30½	½	27	14
¾ to 1½	47	34½	¾ to 1½	33	18
2 to 3	48	35½			
	Lap Weld, extra strong, plain ends				
2	40	28½	2	27	14
2½ to 4	43	31½	2½ to 4	29	17
4 to 6	42	30½	4½ to 6	28	16
7 to 8	38	24½	7 to 8	20	8
9 to 12	33	19½	9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5½ points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

Nominal discounts on less than carload lots, freight added to point of delivery, effective from Nov. 1, 1916, on standard charcoal iron tubes and from April 2, 1917, on lap-welded steel tubes are as follows:

Lap-Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	31	1½ in.	23
2¼ in.	28	1¾ and 2 in.	35
2½ and 2¾ in.	34	2¼ in.	32
3 and 3¼ in.	34	2½ and 2¾ in.	38
3½ to 4½ in.	34	3 and 3½ in.	43
5 and 6 in.	33	3½ to 4½ in.	No quotations
7 to 13 in.	30	5 and 6 in.	37
		7 to 13 in.	34

Above discounts apply to standard gages and to even gages not more than four gages heavier than standard in standard lengths. Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets

Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days.

[Open-hearth stock, $5 per ton above these prices.]

	Cents per lb.
Blue Annealed—Bessemer	
Nos. 3 to 8	8.00 to 8.50
Nos. 9 and 10	8.25 to 8.50
Nos. 11 and 12	8.50 to 8.75
Nos. 13 and 14	8.75 to 9.00
Nos. 15 and 16	9.00 to 9.25
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	8.30 to 8.80
Nos. 22 and 24	8.35 to 8.85
Nos. 25 and 26	8.40 to 8.90
No. 27	8.45 to 9.00
No. 28	8.50 to 8.95
No. 29	8.55 to 9.05
No. 30	8.65 to 9.15
Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	8.50 to 9.00
Nos. 12 and 14	8.60 to 9.10
Nos. 15 and 16	8.75 to 9.25
Nos. 17 to 21	8.90 to 9.40
Nos. 22 and 24	9.05 to 9.55
Nos. 25 and 26	9.20 to 9.70
No. 27	9.35 to 9.85
No. 28	9.50 to 10.00
No. 29	9.75 to 10.25
No. 30	10.00 to 10.50
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	7.80 to 8.30
Nos. 17 to 21	7.85 to 8.35
Nos. 22 to 24	7.90 to 8.40
Nos. 25 to 27	7.95 to 8.45
No. 28	8.00 to 8.50
No. 29	8.05 to 8.55
No. 30	8.05 to 8.55
Nos. 30½ and 31	8.10 to 8.60

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
Sept.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
12	25.50	25.50	61.75	9.60	9.50	8.25	8.00
13	25.75	25.75	62.25	9.00	8.87½	8.25	8.00
14	26.00	26.00	62.50	8.90	8.77½	8.25	8.00
15	26.25	26.25	....	8.85	8.72½	8.37½	8.12½
17	26.25	26.25	62.37½	8.75	8.60	8.37½	8.12½
18	26.25	26.25	61.75	8.00	7.87½	8.37½	8.12½

NEW YORK, Sept. 19.

The markets continue dull with sales few and of small volume. Copper is lifeless but nominally higher. Tin is quiet and steady. Lead is unsettled and much lower. Spelter is firmer with a better tone. Antimony is dull but higher.

New York

Copper.—The better tone which resulted last week from the large purchase for the Allies at 25c. per lb. has given way again to uncertainty and stagnation. The absence of a decision by the Government as to a price for its own needs seems to indicate a decided difference of opinion at Washington. Something definite, which was expected last week, is hoped for this week. The result is continued hesitancy by buyers to purchase any more than absolutely necessary and the market is therefore devoid of transactions sufficiently significant on which to base quotations. As a result of the purchase last week and because of the feeling that 25c. would be the domestic price, quotations were in most cases gradually marked up until yesterday both Lake and electrolytic were regarded as nominal for early delivery at 26.25c. For last quarter the average nominal quotation seems to be 26.50c. to 27c., New York. Quotations in London continued unchanged yesterday at £137 for spot electrolytic and £133 for futures.

Tin.—Since last week there has been but one day on which a fair amount of business was transacted. Last Wednesday, Sept. 12, sales of considerable volume were made quietly, mostly for tin afloat to the United States, for prompt shipment from London and for metal coming overland from Vancouver to New York. Sales were also made for November and December shipment from the East. As a result of this the tone that day was better but for the rest of the week the market dragged. Some spot Banca tin was sold for 60c. in store, New York, with occasional 5-ton lots of spot Straits, which was scarce. The sudden decline in the lead market on Tuesday had a sympathetic effect on tin, interfering with sales. Yesterday and Monday the market was stale and lifeless, with practically no sales. The tone, however, has been easier, due to more liberal arrivals and with sellers apparently more anxious to sell. The quotation yesterday was 61.75c., New York. Arrivals this month have been 1635 tons, an increase of over 100 per cent above those reported last week. The quantity afloat was 4600 tons. The London market has advanced £3½ since last week, the quotation yesterday having been £246 15s. for spot Straits.

Lead.—For the fourth time in three weeks and for the second time in the last week the leading producer has made a reduction in its quotation, bringing its price yesterday to 8c. per lb., New York, which is the figure at which the Government has made its recent purchases for its monthly requirements. The first reduction in the last week of 1c. per lb. was made on Thursday, Sept. 13, and the second one yesterday, Sept. 18. At the time of the first reduction of 1c. few in the trade expected it likely before it occurred. Reasons advanced at the time to explain the price alteration, which is the greatest ever made at one time by the big producer, include the plausible one that refiners' receipts of ores, concentrates and bullion were larger than the sales of the metal. Under such unprecedented price conditions there has been an absence of active demand and of sales and consumers have been content to await developments. Before it took place, some regarded the fixing of 8c. per lb. as a possible bright spot at which level it was thought a greater demand would develop. The realization of this sooner than expected may act as a settling influence on the entire lead market. The quotation yesterday in the outside market was also 8c., New York, or 7.87½c., St. Louis.

Spelter.—The market is stronger and the feeling is better. Quotations are about ⅛c. higher than a week ago for all positions, prompt and September being 8.12½c., St. Louis, or 8.37½c., New York, with October delivery at 8.25c., St. Louis, or 8.50c., New York. In some cases better than these prices has been done, but sales in all instances have thus far been light. Inquiry, while better, is of a modest nature thus far, but is reported to be an improvement over August. Dealers generally expect a gradual improvement from now on, culminating in a strong buying movement in the not distant future. The Government yesterday asked for bids for extended delivery on 1000 tons of grade B spelter, on which the minimum quotation has been 11.50c., with some asking 12c. per lb.

Antimony.—After falling in the past week to about 14c., New York, duty paid, at which price fairly liberal sales were made, the market has rebounded to 15c. to 15.50c. per lb. for Chinese and Japanese grades, but the demand has fallen off and the market is dull.

Aluminum.—The market has declined due to poor demand and is now quotable at 41.50c. to 42.50c. per lb., New York, for No. 1 virgin metal, 98 to 99 per cent pure. For January delivery 42c. has been bid.

Old Metals.—The market showed more activity this week. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26.50 to 27.00
Copper, heavy and wire	25.50 to 26.00
Copper, light and bottoms	22.50 to 23.50
Brass, heavy	18.00 to 18.25
Brass, light	14.00 to 14.25
Heavy machine composition	25.00 to 25.50
No. 1 yellow rod brass turnings	17.25
No. 1 red brass or composition turnings	19.00 to 21.00
Lead, heavy	8.50
Lead, tea	7.00
Zinc	6.50

Chicago

SEPT. 17.—The general aspect of the metal market is considered good from the dealers' point of view. The copper situation is altered by a belief on the part of consumers that the price ultimately to be fixed by the Government will be under 25c. It is predicted that difficulty in procuring this metal will be experienced before long, a contingency which some consumers are preparing to meet by stocking up. Tin is stronger, but there has been no noteworthy buying. Lead is rather weak, the recent reduction by the leading interest being met in some instances by independent smelters. Spelter has a better tone, although the price is unchanged. In antimony the feeling is stronger, some fairly large orders giving the market unexpected strength. We quote as follows: Casting copper, 26c.; Lake, 28c.; electrolytic, 27.50c.; tin, carloads, 63c.; small lots, 65c. to 66c.; lead, 9c. to 9.25c.; spelter, 8c.; sheet zinc, 19c.; antimony, 17c. to 18.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22.50c.; copper clips, 21.50c.; copper bottoms, 21c.; red brass, 21c.; yellow brass, 16c.; lead pipe, 7.25c.; zinc, 5.50c.; pewter, No. 1, 32.50c.; tinfoil, 40c.; block tin, 45c.

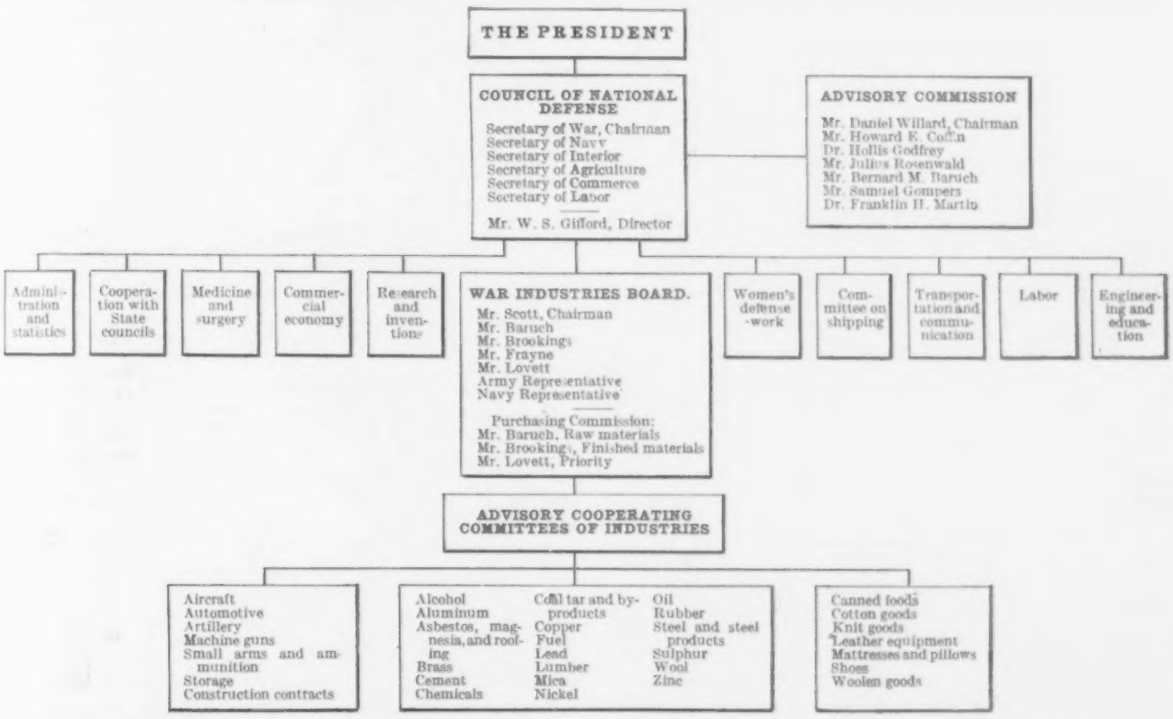
St. Louis

SEPT. 17.—Non-ferrous metals have been rather quiet during the past week and the close today, on carload lots, for the Missouri product was: Lead, 8.92½c.; spelter, 8c. In less than carload lots the quotations today were: Lead, 10c.; spelter, 9c.; tin, 66½c.; Lake copper, 30c.; electrolytic copper, 29.50c.; Asiatic antimony, 18c. In the Joplin district the market for all ores was rather dull.

Workings of the War Industries Board

Chairman Scott Explains Present Functions in Relation to Army and Navy Buying—Larger Scope Expected

WASHINGTON, Sept. 18.—The inner workings of the War Industries Board and its co-ordination with the purchasing bureaus of the War and Navy Departments were the subjects of a hearing in executive session recently given by the House Committee on Appropriations to Chairman Frank A. Scott and Robert S. Brookings of the board. The committee has formally removed the seal of secrecy from the report of the hearing and the correspondent of THE IRON AGE is therefore enabled to present a synopsis of the statements made, which it is hoped will go far toward removing misunderstandings prevailing among manufacturers and dealers who are in position to supply the manifold war needs of the Government. Special interest attaches to this outline of the operations of the board for the reason that it is based upon the interpretation of the law as given by the Attorney General in his formal opinion published in THE IRON AGE of last week.



The Administrative Departments of the Government for the Prosecution of the War As Now Constituted

Much Army and Navy Buying

Chairman Scott and Mr. Brookings were at special pains to explain to the committee the scope of the buying for the Government which the War Industries Board is now doing and to correct the misapprehension that all war purchases are being made or directed by the board. As a matter of fact, the Quartermaster General's Department of the Army and the Bureau of Supplies and Accounts of the Navy Department are making all routine purchases as heretofore, and in the main are doing so without consulting the board. Where the purchase is of an extraordinary character, however, either as to quantity or kind of material, or where there is reason to believe the different purchasing bureaus of the departments may be bidding against each other, and especially in cases where the requirements of the Government are likely to exceed the market supply, recourse is had to the board, which thereupon makes the necessary investigation, determines the proper source of supply, fixes reasonable prices and recommends purchases.

"The powers of the War Industries Board," said Mr. Scott in his statement before the House Committee, "are to co-ordinate the needs of the Army and the Navy, to assist in the acquirement of such needs and to aid in the development of facilities for supplying the requirements of both departments, as well as to assist in securing priority therefor. Mr. Baruch is devoting his attention particularly to the subject of raw materials, Mr. Brookings particularly to the subject of fabricated materials, and Judge Lovett to the subject of priority. Mr. Rosenwald has been the head of the section of manufactured supplies of the old Advisory Commission organization, and he still continues his work as the head of that section, although now he reports to the War Industries Board instead of to the Advisory Commission with respect to that work.

"Heretofore the committees of the Advisory Commission, which have been working on supplies for the Quartermaster's Department, have to a considerable degree made their recommendations direct to a representative of that department. They will now be required to transmit their recommendations to the War Industries Board through Mr. Brookings, who, by the desire of the council and of the President, is to pass on all such matters to see if there is any element of interest represented in the recommendation in order that it may be eliminated before the recommendation passes to the Government department."

Mr. Brookings' Functions

Mr. Brookings, at the suggestion of Mr. Scott, interpolated at this juncture a statement concerning his functions as intermediary between the Government and the contractors. "As I understand it," he said, "it is the desire of the President and of the Council of National Defense that I personally represent the Government and that every contract suggested by these subcommittees shall be submitted to me; that I shall investigate them just as I would if I were spending my own money in every way, both as to the parties named, as to the price and everything else.

"I must satisfy myself about it before I approve it.

I am required to investigate and to ascertain whether any of these advisers were or were not directly or indirectly interested. As I interpret it, that is my responsibility. I have not been in active business myself for some years and have no active interests of any kind, but I am supposed to have sufficient training to enable me to elicit the facts in some form or another. I must go to the bottom of all those things and ascertain them with reference to the things that the Government is being supplied with. I must ascertain when they are needed, where they are needed, and the minimum cost, consistent with an endeavor to derange the markets as little as possible. That is a small responsibility blanketed in a few words.

To Avoid Departmental Competition

"I gather that necessarily in the carrying on of the enormous business of the war there has been more or less confusion, more or less duplication of effort, and, in some cases, competition between the departments of the Government themselves, the Navy Department bidding on the same thing at the same time the War Department was bidding, which might result in a higher price on some articles amounting to 5, 10 or 15 per cent, brought about by both of them bidding at the same time. I do not think it was ever intended that anyone should be criticised in connection with that; it is simply the sort of confusion which has grown out of the enormous undertakings of the departments. We are expected to bring a certain amount of order out of this chaos; we are to co-ordinate all of the Government's interests, as relating to the War Department and the Navy Department, and simply advise these departments where they can get the things they want, because the emergency feature of this sometimes means more than price, and the judgment that we are expected to exercise covers giving the Army and Navy what they need and when they need it. I approach it in that order, because to my mind that is the order of its importance—when they need it, at a fair price to the Government, and with the least possible derangement of the markets."

War Industries Board an Intermediary

Chairman Scott, resuming his statement, told the committee that the functions of the board did not extend to all purchases of the Government nor even to all buying for war purposes. "The work of the board," he said, "relates only to those purchases that are of such character that the intervention of some outside help is needed by the departments. They still go forward with a tremendous volume of war purchasing that is not referred to any of these subcommittees and that probably will not be referred to the War Industries Board. The intention is that anything that is difficult to obtain will be passed on by some individual member of the War Industries Board or by the board itself. May I tell you the reason why I say with perfect co-operation, because you can see that in many things the departments may proceed about their own affairs; they may consult some representative of an industry or representatives of industry and go ahead without reference to the War Industries Board. That is possible, and the board might not even know of such a transaction; but it is the general intention that wherever it is necessary to seek the co-operation of men engaged in the trade or for the purpose of protecting the Government against the interests of particular individuals or groups of individuals the matter will pass through a disinterested body."

Board Has No Authority

Mr. Brookings, in again taking up the statement on behalf of the board, drew attention to the fact that the Secretary of War and the Secretary of the Navy have final authority with regard to purchases of their respective departments. "Everything that we do," said he, "is in an advisory way at their request and subject to their final disposition. It is a matter of form, comparatively, and unless the department has some reason to believe that advice is necessary as to the purchase of a given article they would not come to us, because I think that if an officer of either the War Department or the Navy Department believed that the purchases were proper he would have a perfect right to make them and would be held responsible for those purchases; but I think they recognize that we are acting largely to save the Secretary of War and the Secretary of the Navy from the necessity of going into details of this sort, which they would have to do in order to accomplish this end, but that in the last analysis it all goes to the Secretary of War or to the Secretary of the Navy, and that we might be considered advisory to them. I do not believe we have any authority to do anything, because I think that authority is clearly vested in them by law, and that all we do is in the way of a voluntary advisory service, to be acted upon by those in authority or not."

Board to Buy More

Foreshadowing the ultimate extension of the scope of the board's authority to make purchases of war material, Mr. Scott said that in his judgment it is intended eventually that the board shall "cover the whole field," but that the buying organization of the Government at the moment is too large and too intricate to transfer instantly to the new board. "At present," he said, "the board is helping the departments rather than directing them. The Government is willing to admit that it is not possible for the War and Navy Departments as constituted to-day to carry the full load imposed upon them by the war for acquiring the needs of those two branches of the service, and it therefore has established an industrial reinforcement in the shape of the War Industries Board, supported by many groups of individuals more or less interested in the various industries of the country to assist those departments in acquiring their needs in the shortest possible time at the lowest cost and, if necessary, to aid in the establishment of facilities for the production of things which cannot now be obtained in sufficient quantities.

"An important function of the board, as I understand it, is to broaden as much as possible the contact of the War and Navy Departments with those parts of the American business world with which before the war it was not necessary for them to have relations. Another function of the board, if I may employ mechanical terms, is to furnish a point of insulation to prevent the current of selfish interest from flowing into a department from any section of our business activities."

Resuming his statement, Mr. Brookings said that the moment the War Industries Board was organized the Secretaries of War and the Navy instructed the heads of their departments having to do with purchases to meet the board and reach a clear understanding as to its responsibility and authority. "It lay with me, as the responsible party, to give advice regarding a large number of the items of the finished-product business, and I have explained to all officials that the board is prepared to give any help and assistance it can. We are all interested in just one thing, and that is to win this war. We have told the officials to come to us for anything we can do, that we are here with certain knowledge and certain experience, and possibly, inferentially, these officials have been made to understand that if they do not take advantage of it, it will increase their responsibilities.

"Now, as to how this works out practically in the case of the War Department, it should be understood that the Quartermaster General's department is probably buying 500 articles, the great majority of which are being purchased without advising with anyone. I presume that the articles which it has been necessary to refer to us, as an advisory body, number less than 20 out of 500. These are only the big items that deal with production as well as price. Nearly all these 20 items are absorbing a large part of the production of the country and have to be dealt with with all the economical and business genius that the Government can bring to bear. My impression from talking with the purchasing officers of these departments is that they are very grateful for this opportunity and they realize that aid is necessary if the Government is going to get what it wants when it wants it at anything like a reasonable price."

Direct Buying Illustrated

Replying to a question as to whether a producer of a particular article could approach the departments for its sale or would be required to take the matter up with the War Industries Board, Mr. Scott said that he would be at liberty to approach the department direct if he preferred to do so and that in most cases that course was pursued. "If there is any doubt about the matter," continued Mr. Scott, "the department would notify the board that it is about to buy a certain article of a certain party and the question will be asked as to whether there is any interference with that purchase by any other department of the Army or by the Navy. If the answer is 'No' the purchase will be made. If the answer is that the article about to be purchased is needed 40 per cent by some department of the Navy, then the two departments may buy together or divide the facilities between them or make some adjustment so that each gets its immediate needs.

"There is one very important exception to which I shall call attention and that is a definite order to all the departments issued by the Secretary of War some months ago under date of April 12, making it plain that the desirability of clearing needed items with the other military arm, namely, the Navy, and the desirability that the several bureaus of the War Department should clear with each other, would not relieve any bureau from acquiring what it needed for immediate use and wherever the time was not sufficient to allow it to clear it could acquire its articles and it must proceed immediately to acquire them. That is treated as a military necessity.

Government as Finder of Raw Material

"In many items," continued Mr. Scott, "so long as the war lasts, the Government is bound to be the largest buyer in the market. The cheapest form of buying for the Government will be to anticipate its needs as far in advance on those things as it can and acquire those materials which are necessary to supply those things. For example, if it were shoes, it would be cheaper for the Government to arrange to purchase the raw hides, to arrange for those hides to be tanned at an agreed price for the tanning, to arrange for the purchase of the lasts, because there are at least 90 different sizes of shoes that are made for an American Army, to arrange for the linen thread, for the pegging, and all the items that go into those shoes, and last of all to arrange with the people who will fabricate the shoes, for the cost of fabrication, with the understanding that these elements of the article will be delivered to them. You can see how if that were followed through in that manner it would eliminate all along the line elements of excess profit and the excess of cost which otherwise would remain in the article.

"If the Government were merely to go out and buy the shoes, if what the Government required was a very small number of shoes, so that when it asked for competition there could be actual competition, because the country could supply many more than the total number that the Government asked, the method which I have described might not be the best way to do it, but during this war, with the number of men that our Government now proposes to ask for, it is not possible to have real competition in that article, because the total supply is not equal to the total demand, and in all such cases, whether it were shoes, clothing, or shells, loaded with their detonators or fuses, or whatever the parts were, the further back you could go to the original elements that enter into the fabricated article the cheaper would be the final price that would be paid for the article.

Less Competition Now

"The departments under the peace basis were required by law to advertise a certain number of days and to request competition, and several departments of the Army and several departments of the Navy did buying for those respective departments, and when they went into the market and asked for bids on certain articles it made no difference that they competed with each other, because the total amount that they wanted compared to the total production of the country was so small that you could have actual competition.

"At the present time that is not so. Therefore, the Government now follows the policy of having the Quartermaster General arrange, for example, with the canners, just as the wholesale grocer does, that they will plant a certain quantity of tomatoes, of corn, of peas, of beans, whatever he may expect to require in cans at the end of the season, to be canned at a price for the Army at the end of the season. As I understand, that is the exact arrangement that the Quartermaster General did make with the canners, and he will get those articles at a very much lower price than he would pay if he would wait for the articles to be canned and pass into the hands of the wholesale grocer or remain in the hands of the canner, and then go into the market and attempt to compete with civilian consumption for what articles were in the cans. If you will apply that all the way through to the larger items needed for the conduct of the war, you will have the system that the departments, to a very large extent, are following." W. L. C.

FURTHER CONTROL OF PRICES

Chamber of Commerce Committee Favors Extension of Government Regulation

WASHINGTON, Sept. 18.—A strong recommendation for additional Federal legislation creating authority to control prices during the war accompanies a referendum to ascertain business opinion on this subject, which is now being sent out by the Chamber of Commerce of the United States. The matter is of special interest at this time in view of the agitation for Congressional action on the Pomerene bill authorizing governmental control of the distribution and prices of iron and steel products. Business organizations throughout the country will have the opportunity to vote for or against such a recommendation and 45 days will be given them to discuss the subject, the expectation being that if a decisive majority favors additional legislation, measures to that end will be presented to Congress when it meets in regular session in December.

Raw as Well as Finished Materials

A price control committee of the National Chamber, which was recently appointed to investigate this subject, has recommended that authority to control prices should extend to all articles which have importance in basic industries as well as in war, and which enter into the necessaries of everyday life; that authority to control prices should be extended to raw materials and finished products; that authority to control prices should extend to the prices the public pays as well as those paid by the Government; that authority to control prices should be administered by a small executive board appointed by the President.

It is also recommended that an agency working in harmony with the board controlling prices should have authority to distribute available supplies to those purchasers whose needs are most directly related to the public welfare; and that each leading industry and trade should create a committee to represent it in conference and to advise with agencies that control prices and distribution. In a recent referendum the National Chamber went squarely on record committing its members to the principle that there shall not be a profit interest in war. This position has been reiterated several times by the Chamber since the United States became involved in the conflict. To maintain this principle, however, stable prices are deemed by the Chamber to be absolutely essential. Every seller of products is a purchaser of materials. No business can be satisfactorily conducted if it cannot ascertain its own costs and prices in advance. When there can be no reasonable certainty about the future course of costs for materials and equipment, it is pointed out by the committee in its report, every business faces unknown elements as

soon as it endeavors to determine its scale of operation, the goods it will make, and the prices it should ask for its product.

Protection to Private Buyers

The Chamber emphasizes the fact frequently pointed out in THE IRON AGE that control of prices charged to the Government, whether exercised under authority of law or through voluntary arrangement with the sellers, leaves the situation of private buyers, who have to meet their requirements out of a diminished supply, worse than before the prices to the Government were dealt with. This is the case, too, it is further shown, whether the position of industries buying for further manufacture is considered or the situation of ultimate purchasers among the public.

With respect to foods, feeds and fuel this inequity is recognized in legislation which has just been enacted. The Lever food control act contemplates a system of licensing of manufacturers and handlers of food products and the other articles affected, with the profits of licensees limited by the Government to a reasonable figure. Some commodities the Government may buy in quantities and sell at reasonable prices as a means of influencing the general market. In order that the President may make measures of this kind effective, he may, if necessary, take over and operate the facilities for production, including the mines from which coal is obtained. The extension of these principles to other industries, in the opinion of the Chamber, would serve to stabilize the business of the entire country. W. L. C.

SPECIAL EMBARGO LIST

Administration Tightening Regulation of Foreign Commerce

WASHINGTON, Sept. 18—The Exports Administrative Board has announced a special embargo upon an important list of commodities whose conservation is necessary on account of the limited supply and the needs of the United States in its successful prosecution of the war. This list has been made up without regard to the consideration as to whether the commodities in question may be shipped to neutral countries without risk of reaching the enemy and is based solely upon the broad principle of conservation. The category of articles, the exportation of which is prohibited except under the conditions noted, includes the following:

Acetone, alcohol, aluminum, ammonia salts, ammonia nitrate, anhydrous ammonia, arsenate of lead, arsenate of soda.

Boiler tubes (iron and steel), butter.

Carbolic acid (phenol), castor oil and castor beans, chrome nickel steel, cotton linters, cyanide of sodium.

Ferromanganese, ferrosilicon, ferrovanadium, flax.

Glycerin.

Iron and steel plates, including ship, boiler, tank, and other iron and steel plates ⅛ in. thick and heavier and wider than 6 in., whether plain or fabricated.

Mercury salts.

Nitrate of soda, nitric acid, nitric salts.

Phosphoric acid, phosphorus, pig iron, potash and chlorate of potash, potassium salts.

Saltpeter, scrap iron, scrap steel, searchlights and generators (suited for Army or Navy use), sodium sulphite, spiegeleisen, stearin and stearic acid, steel billets, steel blooms, steel ingots, steel sheet bars, steel slabs, sugar, sulphate of ammonia, sulphur and sulphuric acid, superphosphate.

Tin plate, toluol, tungsten.

Wireless apparatus.

Exceptions Permitted

Export licenses may be granted, however, for the above articles when destined for actual war purposes or when they will directly contribute thereto; and in certain unusual cases when such exports will contribute directly to the immediate production of important commodities required by the United States; and also in certain other cases where the articles may be exported in limited quantities without detriment to this country. Further, licenses may also be granted for limited quantities of these conserved articles when required for purely medicinal or pharmaceutical purposes.

Shipments in Transit to Canada

To facilitate exports to Canada and Newfoundland, the Bureau of Export Licenses has heretofore issued, through the customs service, a special license whereby goods have been permitted to enter Canada and Newfoundland without individual licenses for each shipment, except in the case of certain articles which the Exports Administrative Board has heretofore found it necessary to conserve, namely:

(1) Iron and steel plates, including ship, boiler, tank and all other iron and steel plates ⅛ in. thick and heavier, and wider than 6 in., whether plain or fabricated; iron and steel scrap, pig iron, steel billets, for which individual licenses have been required for shipments made on bills of lading dated on or after Aug. 16, 1917.

(2) Ferromanganese, ferrosilicon, spiegeleisen, steel sheet bars, steel blooms, steel ingots, steel slabs, for which individual licenses have been required for shipments made on bills of lading dated on or after Aug. 29, 1917.

All the other articles above mentioned, which are now added to the "Conservation List" in accordance with this statement, will likewise require individual licenses for each shipment of such additional conserved commodities as are covered by bills of lading dated on or after Sept. 20, 1917. This date has been fixed in order to avoid interference with goods in transit.

Application Forms

To procure export licenses for articles on the "Conservation List" shippers must use Application Form A-3 for proposed shipments of—

Pig iron, ferromanganese, ferrosilicon, spiegeleisen, steel ingots, billets, blooms, slabs and sheet bars; iron and steel plates, including ship, boiler, tank (and all other iron and steel plates ⅛ in. thick and heavier, and wider than 6 in., whether plain or fabricated); scrap iron, scrap steel, when destined to any country in the world.

For all other commodities controlled by the President's proclamation of Aug. 27, 1917, shippers must use Application Form A-1 for proposed shipments to the following countries, or their colonies, possessions, or protectorates:

Albania	Norway
Denmark	Spain
Kingdom of the Netherlands (in Europe)	Sweden
	Switzerland

Shippers must use Application Form A-2 for proposed shipments to the following countries, or their colonies, possessions, or protectorates:

Abyssinia	Liberia
Afghanistan	Mexico
Argentina	Monaco
Belgium (that portion not occupied by Germany or her allies)	Montenegro
	Morocco
	Nepal
Bolivia	The colonies, possessions and protectorates of the Netherlands
Brazil	
China	
Chile	Nicaragua
Colombia	Oman
Costa Rica	Panama
Cuba	Paraguay
Dominican Republic	Persia
Ecuador	Peru
Egypt	Portugal
France	Roumania
Greece	Russia
Guatemala	Salvador
Haiti	San Marino
Honduras	Serbia
Italy	Siam
Great Britain	Uruguay
Japan	Venezuela

Fuel Administrator Garfield has requested the Export Administrative Board to allow no coal to be exported from the United States without specific licenses, and further that the board authorize no such licenses before notifying him of the application. This step was taken by the fuel administrator in order that he might keep in close touch with both the quantity and the destination of coal exports.

The action is specifically for the purpose of protect-

ing the northwest part of the United States, which has been complaining that it has not been receiving its fair share of the coal sent to Lake ports. An investigation by the fuel administration substantiated this complaint. It was found that plenty of coal was reaching the Lake ports, but it was not getting through to the Northwest.

In the period between Aug. 24 and Sept. 6, out of a total of 1,755,812 tons, 530,973 tons, or 30.2 per cent, had been shipped into Canada. This is far in excess of the proportion of Canadian exports by Lake ports in normal times.

The fuel administration does not intend to cut off Canadian exports, but with this supervision it will be able to equalize the distribution of coal, and see that the Northwest and Canada both get their fair shares.

Machine for Making Metal Briquets

An improved machine for making briquets, which U. S. Consul Homer M. Byington, Leeds, England, reports to be attracting considerable attention in that country, is said to produce briquets 2½ in. in diameter with an average length of 2¼ in. These products, made from metal as used in shell fuses, weigh 2 lb. 13 oz. each and the machine is said to turn out 23 hundredweight (2576 lb.) of briquets an hour. The saving from the briqueting of brass borings varies from 5 to 15 per cent, it is claimed, depending largely on the class of metal treated and the care and efficiency of the whole smelting process. If it is operated 20 hr. a day it is said that the machine could yield 115 tons in a week of five days. If 7½ per cent is gained by briqueting, this means that 115 tons of metal briquets would yield 8 tons, 12½ hundredweight more metal than the same quantity of unbriqueted borings when smelted would yield. At the average price during the half year 1917 of about £120 ($584) per ton for this metal, the weekly saving would represent £1,035 ($5,037), against which would have to be reckoned the cost of briqueting. Labor and power are put at not to exceed $0.97 per ton of briquets made.

The machine also will make briquets of cast-iron borings and will turn out about 1 ton per hr. At 1917 prices of borings and iron, the briquets would be worth about $25.55 per ton and the profit derived from the briqueting would amount to $9.73 per ton.

A large machine may be constructed to turn out briquets 4 in. in diameter by 3 to 3½ in. in height, when the output would rise to fully 4 tons per hr. The name of the patentee, the manufacturer and the United States patent number of the machine mentioned may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, or its district or co-operative offices. A photograph of the machine may be inspected at the bureau or its district offices.

Decreased Contracting for Fabricated Work

The records of the Bridge Builders and Structural Society, as collected by its secretary, George E. Gifford, 50 Church Street, New York, show that 38 per cent of the entire capacity of the bridge and structural shops of the country was put under contract in August. This corresponds to about 68,500 tons and is the lowest rate at which fabricated business has been done since 1911, except in September, 1913, when the total tonnage booked was about 64,000 tons, and in the seven months immediately following the outbreak of the war in August, 1914, when the rate for that period was about 52,000 tons per month. So far this year about 780.000 tons of bridge and building work have been closed against 980,000 tons for the same period of 1916. The total amount of such business done in both 1915 and 1916 was about 1,500,000 tons, so that in the eight months of 1917 the volume of business totals about one-half of that done in the 12 months of the two years preceding.

The total membership of the American Society for Testing Materials is now 2218, an increase since the annual meeting in June of 51.

Pittsburgh and Nearby Districts

The first of the fall and winter meetings of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Monday evening, Sept. 17, and was largely attended. L. A. Way, president, was in the chair and F. H. Zimmers was secretary. Professor A. B. Wright of the political science department of the University of Pittsburgh gave an address on "Our Aims in the War." Professor Wright believes in the vigorous and effective prosecution of the war, and in addition stated that he does not believe the Government should name prices on iron and steel products for domestic consumption. The meeting was preceded by a dinner.

The Valley Mold & Iron Corporation, Sharpsville, Pa., large manufacturer of ingot molds, has opened offices in room 491 Union Arcade Building, Pittsburgh, in charge of Floyd K. Smith, vice-president of the company.

E. W. Mudge & Co., Frick Building, Pittsburgh, have blown out Claire furnace at Sharpsville, Pa. The stack will be relined, the bosh and hearth enlarged, and a new engine, purchased from the Brier Hill Steel Co., of Youngstown, Ohio, is being installed. The Sharpsville Boiler Works, Sharpsville, Pa., is doing all the plate work, and it is expected to have the stack in operation again early in November. The output will be increased to about 350 tons per day. Ella furnace of this company at West Middlesex, Pa., is in blast, turning out about 350 tons of Bessemer iron per day.

Fixing Metal Prices in Australia

A metal exchange for Australia at Melbourne, similar to the London exchange, is to be established according to reports from that country. Instead of metals being sold to London, they will be sold to Sydney and Melbourne and treated in Australia. Efforts are being made to fix a standard price for copper for three years. If the smelters are prepared to treat all grades of tin ore at a fair price, the ministry is willing to stop the exportation of tin ore for all time. The federal government has made arrangements as regards zinc, fixing the prices for 10 years. Regarding rare metals, the ministry has submitted a scheme to the producers whereby the government will take over the whole of the tungsten production at the world's current prices. Australia will probably have a representative at the Material Resources Bureau in London

Norway's Imports and Exports of Steel and Iron

Norway's imports of some leading iron and steel products are given as follows in metric tons for 1916 as compared with the two previous years:

	1914	1915	1916
Pig iron	32,200	39,700	34,800
Bars, rods and hoops	45,000	64,900	60,200
Plates and sheets, plain	41,100	71,500	55,400
Sheets, tinned and galvanized	34,000	41,200	29,300
Wire	17,500	20,400	14,700

Exports, compared for the same years, have been as follows, in metric tons:

	1914	1915	1916
Ferrosilicon	6,144	9,308	24,789
Iron ore and iron-ore briquets	467,800	425,900	414,700
Pyrites of iron and copper	360,200	466,800	251,800
Crude zinc	16,517	22,617	28,150
Aluminum	2,942	2,883	4,270

The increase in ferrosilicon, probably for munition steel purposes, as well as in crude zinc, is marked.

Decided to Strike

The machinists' unions of Bridgeport, Conn., have voted to go on strike to obtain demands recently presented and have appointed a committee to set a day for the walk-out. The Government has been trying to prevent a strike until arbitration had been tried, but its efforts have apparently proved unavailing. It is claimed that 133 plants will ultimately be affected.

CARBON ANALYSIS BY COLOR

Slowly Cooled Steels with Same Manganese Content Essential for Comparisons

THE color carbon determination for steel, originally devised by Eggertz, is not employed to as great an extent as formerly because of the rapidity and accuracy of the direct combustion process. It still remains, however, a valuable method and, when carried out with the proper care, is not only rapid but accurate. There have been numerous studies of this interesting process, the most recent of which was carried out by the eminent French savant, H. Le Chatelier, and one of his students, F. Bogitch. Their paper was published in the *Revue de Metallurgie*.

The first part is introductory, but the theory of the process, as outlined by Osmond, is worth repeating. Under the action of nitric acid, the drillings rapidly dissolve giving ferric nitrate, the combined carbon in the metal dividing into two parts. One dissolves immediately forming a brown solution, the other remains at first insoluble as a brownish flocculent precipitate. Raising of the temperature and a continuation of the heating discolors the primary solution by driving off the carbon in the form of carbon-dioxide and cyanogen. On the other hand the flocculent precipitate, as it dissolves, tends to deepen the color. This new carbon disappears as a gas in its turn, but more slowly than the primary dissolved carbon. The authors speak of the numerous conditions that affect the correct carrying out of the process and then investigate these.

Strength of Acid and Speed of Solution

The first of these conditions is the concentration of the acid as related to the speed of solution of the drillings. The temperature employed throughout the experiments was that of boiling water and the maximum speed was obtained with acid of 1.18 to 1.15 Sp. Gr. The 1.18 acid was made by diluting 40 c.c. of 1.40 acid to 100 c.c. In diluting the solutions for comparison they recommend the use of ferric nitrate solution instead of distilled water, prepared by dissolving electrolytic iron in nitric acid. This is particularly valuable in the case of steels low in carbon.

Their studies lead them to propose the following method: The drillings or turnings are placed in a conical flask of 250 cc capacity, and for each gram of steel 20 c.c. of cold 1.16 nitric acid is added, then rapidly heated so as to bring it to a boil in 1 min. After boiling 1 min. 30 c.c. of boiling nitric acid of 1.23 Sp. Gr. is added and the boiling continued for 3 min. The total operation therefore lasts for 5 min. (The reason for the addition of the stronger acid is that the flocculent precipitate dissolves more rapidly in stronger acid.) At the end of the 5 min. the solution is quickly cooled by dipping the flask into water and shaking it, this cooling lasts for 1 min. The color comparison is then made with a similarly prepared solution of a standard steel of similar composition and treatment.

Influence of Other Elements

Some very interesting observations are then made on the influence of the percentage of carbon, the presence of manganese, of nickel, of silicon and the influence of heat treatment. The differences of speed of cooling of the steels modify considerably the coloration of the solution due to carbon, even with speeds of cooling altogether insufficient to give real quenching (that is the formation of martensite). The fineness of division of the cementite in the pearlite modifies the solubility of the carbon and the hardness of the steel. This influence of speed of cooling is the more marked the richer the steel is in manganese. The depth of color may be reduced one-third in this way. That is to say if the color test is made on a steel cooled quickly, taking as standard a similar steel cooled slowly in the furnace, the percentage found would be one-third too low. On the other hand, if the sample taken as standard were from a steel cooled rapidly the result on a steel slowly cooled would be one-third too high.

The conclusion of the second part of the research is that to use properly the Eggertz color carbon determination it is indispensable to work on samples from slowly cooled steels and furthermore to use, as standards, steels containing practically the same manganese contents as the steels being tested. G. B. W.

Government Price Fixing Expected This Week

WASHINGTON, Sept. 19 (*By Wire*).—The impression is strong here to-day that the Council of National Defense, at the direction of the President, will this week announce the prices the Government will pay for copper and for iron and steel. It is rumored copper will be bought at a flat price in the neighborhood of 24c. As to iron and steel, the President is said to be still in doubt whether an attempt should be made to fix a scale of basic prices or authorize purchase to be made at cost of production plus a certain percentage of profit.

Strike at Eliza Furnaces of Jones & Laughlin Steel Co.

PITTSBURGH, Sept. 19—(*By Wire*)—The labor troubles at the Eliza blast furnaces of the Jones & Laughlin Steel Co., Pittsburgh, are still unsettled. On Wednesday morning, Sept. 19, there were five of the six Eliza blast furnaces banked and Soho blast furnace, which is located near the Eliza furnaces, was also banked. The strikers have made up a set of demands which they have presented to the company and which are as follows:

"That there shall be no discrimination shown by the company toward any man now on strike, that the men be given an 8-hour day, with time and a half for overtime for four hours and double time after the 4-hour period, that the men be paid double time for all work done after noon on Saturday and for work on Sundays, New Year's Day, Decoration Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas; that the men be given an increase of 25 per cent in wages in all branches, and that no man be paid less than $3 for eight hours' work; that the men working nights be put on a 48-hour weekly basis to be made the first five nights of the week, and double pay for all overtime; that the company recognize a duly elected shop committee of employees for the adjustment of all grievances."

The shortage in pig iron caused by the banking of the blast furnaces is seriously affecting operations at the steel works of the company on the South Side, Pittsburgh. The duplexing department is off and the Bessemer and open-hearth departments are running very light and will have to close in a few days unless the trouble is settled.

On Wednesday morning from 3500 to 4000 men were idle on account of the strike of the furnacemen. No conference has yet been held with the company and prospects for an early settlement of the trouble are not very good.

Six-ton electric furnaces of the Graves-Etchells type will be installed by the American Radiator Co., Buffalo, N. Y., and by the Singer Sewing Machine Co., New York, according to an announcement of the Electric Furnace Construction Co., Philadelphia. This makes a total of five furnaces of this type installed so far in this country.

The roll-over straight draft molding machine is the subject of a generously illustrated bulletin issued by the National Founders' Association as No. 8 of the series issued by its committee on foundry methods.

No. 1 furnace at the North Lebanon (Pa.) plant, Bethlehem Steel Co. has been banked for repairs. The men employed at the furnace will be used in other parts of the plant.

The British Minister of Munitions on Aug. 24 prohibited dealings in tin plates and terne plates except under license.

PERSONAL

J. J. Nordman, formerly secretary of the Foreign Trade Commission of Pittsburgh, and also secretary of the Pittsburgh Export Co., has retired from those two organizations for the purpose of acting as American purchasing representative for foreign account, under the trade name of J. J. Nordman & Co., with offices in the Farmers' Bank Building, Pittsburgh.

C. W. Bennett has resigned, effective Sept. 30, as vice-president and general manager of the American Metal Wheel Company, Toledo, Ohio. He has disposed of his interests in the company and after a winter's vacation in California expects to establish a new business connection.

R. F. Williams, for six years connected with the Pittsburgh office of Manning, Maxwell & Moore, Inc., has resigned and is now connected with the Sherritt & Stoerr Co., Inc., Philadelphia, dealer in machine tools, railway and machine shop equipment.

Norman L. Warford, mechanical engineer, in charge of construction for the Powdered Coal Engineering & Equipment Co., Chicago, recently sailed from New York to take up his new duties as engineer in charge of the coal-pulverizing and copper smelting department of the Société des Mines de Cuivre de Catemou at Catemou, Chile. Mr. Warford has had many years' experience in the use of powdered fuel and was the designer and first operating superintendent of the installation of the Anaconda Copper Mining Co., Anaconda, Mont., where about 1000 tons of powdered coal per day are used in reverberatory copper smelting furnaces.

E. Jordan, Toronto, Ont., has been appointed general manager and chief engineer of L'Air Liquid Society, manufacturers of acetylene and welding machinery, etc., head office Maisonneuve, Que., in succession to E. Royer, who resigned to go into business on his own account in Montreal. Mr. Jordan recently came to Canada from France, but had previously visited Canada. The company is erecting a new manufacturing plant at Halifax, N. S., and is building an addition to its Toronto plant.

H. T. Harrison, who has been chief engineer of Corrigan, McKinney & Co., Cleveland, Ohio, for several years, and under whose directions this firm's steel plant and new blast furnaces were erected, has been appointed general manager of the firm and has been succeeded as chief engineer by J. Y. Blackwood, formerly chief draftsman.

The Asbestos Protected Metal Co., Pittsburgh, is well represented in the army, the following being a list of employees in responsible positions who have entered the service: Stuart S. Caves, engineering department, now of officers' reserve at Ft. Niagara; F. C. Easterby, district representative at St. Louis, now constructing quartermaster, Ft. Riley, Kan.; W. C. Fanning, engineering department, now of officers' reserve, Ft. Niagara; Wm. H. Hale, district representative at Minneapolis, Minn., now of officers' reserve; E. G. Irwin, district representative at Cincinnati, now in the South with Ohio National Guard regiment; J. R. Nichols, district representative at Atlanta, Ga., now captain of field artillery; Walter A. Slingluff, skylight department, now with Pittsburgh regiment of engineers in France; John B. Williamson, erection department, now first lieutenant of engineers; P. J. Young, chief engineer, now first lieutenant of engineers in France; T. R. Galey, district representative at Dallas, Tex., now of officers' reserve, Leon Springs, Tex.

Elbert H. Gary, chairman of the United States Steel Corporation, has returned to New York after a six weeks' vacation in Alaska.

Gen. T. C. du Pont has joined the directorate of the Vulcan Steel Products Co., 120 Broadway, New York. Other new members on the board of directors are former Postmaster-General Frank H. Hitchcock, who becomes vice-president, and L. W. Baldwin, Empire Trust Co., New York.

William L. Austin has retired as chairman of the Standard Steel Works, Philadelphia, and has been succeeded by William Burnham.

J. C. Pinney, Jr., since May, 1912, superintendent of bridges and public buildings, city of Milwaukee, Wis., has been granted a leave of absence for three months to assume the position of dean of the college of engineering, Marquette University, Milwaukee. He takes the place of John C. Davis, who has been commisisoned a captain in the United States Coast Artillery.

J. B. Morris, chief engineer of the steamship Great Northern of the Great Northern Steamship Co., of San Francisco, has been appointed chief inspector of machinery for the United States Shipping Board in Seattle.

J. B. Laird, until recently connected with the Moore Steam Turbine Corporation, Wellsville, N. Y., has resigned his position with that company to go into the machine tool business.

Thomas Stanion, for a number of years connected with the Commonwealth Steel Co., St. Louis, and during the past year with the White Sewing Machine Co., Cleveland, has accepted the position of safety engineer in the Government service and has been assigned to the navy yard at Charleston, near Boston.

Eugene Kelly, assistant secretary of the Syracuse Smelting Works of Brooklyn, has taken full charge of the Chicago office of that company.

H. J. Richardson has been appointed works engineer for the Berger Mfg. Co., Canton, Ohio. His new work includes the power plant, new construction, maintenance and repair of manufacturing equipment and buildings. Mr. Richardson recently was connected with the New England Westinghouse Co. as manager of the gage department. Previous to this connection he was acting chief engineer of the ordnance department of the Crucible Steel Co. of America, at Harrison, N. J., and prior to that for a long time was with the Commonwealth Edison Co., of Chicago.

Norman R. McLure, for the past three years chief engineer of the Phoenix Iron Co., Phoenixville, Pa., has resigned that position and formed a connection with the Taylor-Wharton Iron & Steel Co., High Bridge, N. J. He will assist for the time being in the construction and operation of the extension to the plant of the Tioga Steel & Iron Co., a subsidiary in Philadelphia, in which the ordnance contract recently taken by the company from the Navy Department will be executed.

John E. Kemp, for several years civil engineer of the National Tube Co.'s Kewanee Works, now Walworth Mfg. Co., Kewanee Works, has received a commission as captain in the United States Engineers Corps, and is at the U. S. Engineer Officers' School at Ft. Leavenworth, Kan. During his military service his work at Kewanee Works will be assumed by John J. Harman, formerly associated with the Elliott & Harman Engineering Co., Peoria, Ill.

J. R. Van Dyk, of the Van Dyk-Churchill Co., Singer Building, New York, machine tools, has become associated with the Exports Administrative Board in Washington as trade expert. Mr. Van Dyk has general supervision over export licenses for machinery and machine tools.

F. M. Long, representative in France of the Gisholt Machine Co., Madison, Wis., arrived in New York last week, and will remain here for a few weeks.

R. F. Williams, formerly connected with Manning, Maxwell & Moore, Inc., Pittsburgh office, has become connected with the sales department of the Sherritt & Stoer Co., Inc., Philadelphia, machine tools.

The following organization changes have been made in the Baldwin Locomotive Works: Samuel M. Vauclain, vice-president and general manager, has been made senior vice-president; James McNaughton, formerly with the American Locomotive Co., has been made consulting vice-president; Grafton Greenough, sales manager, has been made vice-president in charge of sales; John P. Sykes, general superintendent, has been made vice-president in charge of manufacturing.

The following changes have also been made in the organization of the Standard Steel Works, a subsidiary of the Baldwin Locomotive Works Co.; Alba B. Johnson has been elected president to succeed William Burnham. Mr. Burnham has been made chairman of the board to succeed Wm. L. Austin and Samuel M. Vauclain has been made senior vice-president.

John E. Woods, manager of sales, Carnegie Steel Co., Cincinnati, has been promoted, and transferred to the sales department of the company at Pittsburgh as assistant general manager of sales in charge of plates and structural material succeeding the late J. W. Dix. He will be succeeded as manager of sales in Cincinnati of the Carnegie and Illinois Steel Companies by J. G. Carruthers, who has been his assistant for several years past.

J. Arthur House, first vice-president of the Guardian Savings & Trust Co., Cleveland, has become connected with M. A. Hanna & Co. He will look after that firm's important financial matters and be associated in a general capacity with the firm's business.

P. J. Moran, general superintendent of the Detroit Iron & Steel Co., Detroit, has been appointed general manager of the blast furnaces of the M. A. Hanna & Co. succeeding Max McMurray, who has resigned to become president of the Cromwell Steel Co., Cleveland. Mr. Moran's first connection with the iron and steel industry was with the Hannah furnace of the Republic Iron & Steel Co., Youngstown, Ohio, where he worked up to the position of superintendent. Later he became general superintendent of the United Iron & Steel Co., operating the Fannie and Cherry Valley furnaces and held this position when these stacks were taken over by the Hanna interests. When the Detroit Iron & Steel Co., controlled by M. A. Hanna & Co., built its second stack in Detroit in 1910, Mr. Moran was given a promotion by being made general superintendent of the Detroit furnaces.

George A. Turville, secretary and treasurer Crucible Steel Co. of America, was appointed a vice-president of the company at a meeting of the board of directors held Sept. 17, and J. M. McComb, credit manager, was appointed an assistant treasurer.

E. B. Hotchkiss, American Steel Export Co., sailed Aug. 28 for France. He is to visit France, Italy and Spain in connection with a number of large engineering problems. He resided in France and Belgium for over 19 years in charge of engineering work.

George McCall was elected vice-president of the Westmoreland Coal Co., Philadelphia, Sept. 18. Herman Roll succeeds him as treasurer and Howard R. Yearsley is now secretary of the Westmoreland Coal Co., Penn Gas Coal Co. and Manor Gas Coal Co. George B. Seyms was appointed manager of sales of each of the companies.

A. D. Shankland has been appointed chief chemist of the Lehigh and Saucon plants of the Bethlehem Steel Co., succeeding F. O. Kichline, recently transferred to Lebanon, Pa. Samuel Lewis has been appointed chemist at the Saucon laboratory, succeeding A. R. Hartzell, resigned.

Fred H. Brussel, formerly foreman of the pattern shop of the Bayview Foundry, Sandusky, Ohio, and A. Helmrich have gone in business for themselves, having organized the Sandusky Pattern Company of Sandusky. Mr. Brussel is president and general manager of the company and Mr. Helmrich is secretary and treasurer.

Emile Chouanard, Forge Vulcane, rue St. Denis, Paris, is expected shortly to arrive in this country to purchase a large quantity of machinery.

Charles M. Terry, president Charles M. Terry, Inc., dealer and exporter of machinery, railroad and engineering materials and supplies, operating in Australia, is in this country on a business trip and is located at the offices of the company, 23-25 Beaver Street, New York.

Lawrence H. Cooney, general manager of the St. Algoma Steel Co. plant and wharves at Sault Ste. Marie, Ontario, Can., has resigned. He was for many years in charge of the rolling mill department of the Ohio Works, Carnegie Steel Co., Youngstown, Ohio, before going to Canada three years ago. He is to be succeeded at the Algoma works by James Nelson, formerly of Youngston, but for the past year in charge of the duplex department of the Bethlehem Steel Co. at Bethlehem, Pa. Mr. Nelson was in charge of the open hearth department of the Ohio Works, under Lewis H. McDonald, before going to the Algoma company more than two years ago. From Sault Ste. Marie he went to the Bethlehem works to take a better position.

Edel Moldenke, son of Dr. Richard Moldenke, Watchung, N. J., is now en route to Burmah, where, as geologist of the Burmah Mines, Ltd., he will conduct explorations for lead in the districts bordering on Thibet.

T. M. Avery, one of the New York City representatives of the Blaw-Knox Co., of Pittsburgh, has gone to the Pacific Coast to take charge temporarily of the San Francisco office of that company. Edwin M. Ornitz, its San Francisco representative, has joined the Engineering Corps as first lieutenant.

F. H. Willcox has resigned from the Huessener Engineering Co. to become associated with Freyn & Co., Chicago.

Thomas S. Garrett has resigned as manager of the machinery department of Easton, Williams & Wigmore, Inc., New York, to go into business for himself after taking a rest.

D. S. Forsyth of Louisville, Ky., has been appointed auditor of Rogers, Brown & Co., Cincinnati, succeeding the late J. Russell Houston.

OBITUARY

GEORGE W. KING, president of the Marion Steam Shovel Co., Marion, Ohio, died Sept. 9, aged sixty-three years. He had been connected with the company since its formation in 1884, and had been its president since 1904.

ELWOOD BEAUMONT BLANDY, one of the best known men in the pig iron business in the Eastern territory, died at his home in New York Sunday, Sept. 16, after an illness of a week with pneumonia. Mr. Blandy was 63 years of age and was born at Zanesville, Ohio. When a very young man, he was engaged for a few years in the machine works at Zanesville owned by his father, and then went into the selling of pig iron, in which he continued throughout his life. For a number of years he was connected with George H. Hull in New York and was active in selling Alabama irons. Later he represented M. A. Hanna & Co. at Buffalo and was also for a time connected with B. Nicoll & Co. For several years before its absorption by the Steel Corporation, Mr. Blandy was general sales agent of pig iron of the Tennessee Coal, Iron & Railroad Co., and seven years ago became New York representative of Pilling & Crane. He resigned Sept. 1 to accept the position of secretary of the Northern Ore Co. of New York, which some months ago acquired the Keystone blast furnace at Island Park, near Easton, Pa., formerly owned by the Thomas Iron Co. Mr. Blandy is survived by his wife and a son, Thornton, who lives in Washington.

GEORGE S. RIDER, head of George S. Rider & Co., engineers, Cleveland, designer of many large industrial plants, died suddenly of heart failure, Sept. 11. He went to Cleveland from Providence, R. I., 25 years ago, and opened offices as consulting engineer. He was a member of the American Society of Mechanical Engineers and of the Cleveland Engineering Society.

HARRY L. ALLEN, assistant to the fourth vice-president of the American Steel Foundries, died at Cleveland, Aug. 31. President Lamont says of him: "Under 35 years of age at the time of his death, he was, in point of service, one of the old employees of the company, having come to it at the time of its organization, 15 years ago, along with others of the staff of the

American Steel Castings Co. Starting as an office boy, without influence of any kind, and in spite of a frail body which always put a limit to the activities of his more than ordinary mind, he had for nearly five years occupied an important position among the officers of the company. Always a careful and painstaking student of his work, especially along chemical and metallurgical lines, he possessed organizing and executive abilities of a high order. The company suffers a real and serious loss in his death."

SOUNDS NOTE OF WARNING

Chairman of Appropriations Committee Makes Important Statement

WASHINGTON, Sept. 18.—The final war budget of the current special session, which has been increased by the House from $4,800,000,000 to $7,023,786,000, will probably be passed by the Senate and disposed of in conference during the coming week. The bill now carries cash appropriations of $4,769,583,000 and authorizations to make contracts in advance to the extent of $2,254,000,000. The increases in the bill made by the House include $993,604,000 in cash and $1,219,202,000 in authorizations. The biggest cash item in the House amendments is $635,000,000 for the Shipping Board, to which is added permission to contract for work amounting to a further sum of $849,000,000 to be appropriated next December.

For the new fleet of destroyers planned by the Navy Department, the House has granted $225,000,000 in cash and authority to contract for $125,000,000 more. The bulk of the remainder of the increase added by the House has been provided to meet estimates of the War Department for ordnance, including machine guns, mountain and siege guns and field artillery for which the house has given $132,621,000 in cash and $245,000,000 in authorizations to make contracts. These enormous sums, it will be understood, are carried by the bill in addition to the amounts reported in the original measure and heretofore described in this correspondence. In making up the bill in committee no less than $42,000,000 of estimates furnished by various Government departments were rejected.

During the debate on this record-breaking budget bill Representative Fitzgerald, chairman of the House Committee on Appropriations, warned his colleagues that because of the colossal appropriations already authorized there will be a deficit of no less than $2,600,000,000 at the end of the current fiscal year in spite of the heavy program of taxation about to be adopted by Congress. This deficit, he said, would have to be provided for and would soon force an increase in the war profits tax to a maximum of 80 per cent and in the income tax to 60 per cent in addition to other tax levies.

CALLS WAR BOARD INADEQUATE

Waddill Catchings at Chamber of Commerce Convention Advocates Reorganization of Buying System

Waddill Catchings, president Sloss-Sheffield Steel & Iron Co., New York, in addressing the convention of the Chamber of Commerce of the United States at Atlantic City on Tuesday, advocated the entire reorganization of the Government's purchasing system, declaring that the recently created War Industries Board had failed to meet the situation for lack of complete authority under the law.

"Chaos exists in business to-day," declared Mr. Catchings, "and order must be brought out of the situation if we are to win the war. The price control committee of the Chamber of Commerce, the Wall Street man, the farmer, distributer and merchant, all are of this opinion. The Government, we are informed, intends to spend $19,000,000,000 for itself and its Allies during the next year. When we consider that the entire gross turnover of the United States Steel Corporation and its subsidiaries is $853,000,000 each year, it will be seen that the Government will place upon business a demand 20 times as great."

In advocating a general war board with the broadest powers Mr. Catchings declared that competitive buying between the Government and private industry had produced high prices. The power to make purchases, he said, should be taken out of the hands of the army and the navy. The War Industries Board, he said, had filled a useful purpose but was not the proper kind of an organization. With the power to fix all prices, he asserted, the Government should be given authority to decide not only priority of railroad shipment, already given it, but priority of purchase as between individual manufacturing firms. The shortage of materials, he said, forces out of business not the industry least needed but the industry least able to pay the bill.

HOPKINS & ALLEN ARMS CO.

Federal Court Orders Sale of Plant to Satisfy a $3,850,000 Mortgage Held by Belgian Government

Judge Edwin S. Thomas of the United States District Court, New Haven, Conn., has ordered the sale of the equity in that portion of the plant of the Hopkins & Allen Arms Co., Norwich, Conn., that is encumbered by mortgage. The plant has been in the hands of receivers for several weeks. The company had an order for the manufacture of 150,000 Mauser rifles for the Belgian Government, but had delivered only 11,392 of the rifles. The contract price for the rifles was $27 and under the terms of the contract the Belgian Government advanced $1,012,500. The company soon needed more money and got it from that Government in the form of successive loans, secured by a mortgage on certain of the property. Aside from the $1,012,500, the principal and interest of these loans now amount to about $3,850,000. Bids for the plant are to be opened Oct. 17. The lowest bid that will be accepted for the equity is $65,000 and the purchaser must assume a mortgage of $200,000 which secures an outstanding issue of bonds of the company, as well as the Belgian mortgage.

At the hearing, the receivers, the Belgian Government, the United States War Department and a protective committee of stockholders were represented. A bid from the Belgian Government for the property is assured and if it secures the plant it will turn the contract over to the Marlin-Rockwell Corporation, New Haven, Conn., which will operate the plant and complete the order for rifles at a price of $42.30 each. The Belgian Government will assume all sub-contracts of the Hopkins & Allen Arms Co. and will not bring suit against the company for failure to complete the contract.

Capt. Perry Osborn, representing the United States Government, told the court that the Government had determined to secure machine guns manufactured at this plant and it was hoped that there might be a solution of the situation. The Marlin-Rockwell Corporation is one of the larger manufacturers of machine guns and would carry on this work while completing the Belgian rifle contract.

The Continuous Zinc Furnace Co., Hartford, Conn., which developed the "Johnson" process of electric smelting of zinc-lead ores to save all the values, has sold the major right and title in this process to the American Smelting & Refining Co. The latter company will build a commercial furnace at one of its Western plants and develop the process, which it is claimed uses ores now commercially valueless and also largely eliminates labor.

The Dominion Steel Corporation has started work on the extensive improvements undertaken at its iron ore properties at Wabana, Newfoundland, with the object of increasing its annual output of ore from 800,000 tons to 1,500,000 tons per annum.

SHIP CONTRACTS AWARDED

Government Arranging for Building of Large Number of Vessels

WASHINGTON, Sept. 18.—The Emergency Fleet Corporation has finally signed the long delayed contracts for Government-owned shipyards and the construction of fabricated steel ships therein with the American International Corporation and the Submarine Boat Corporation. A similar contract with the Merchant Shipbuilding Corporation will probably be executed in a few days. Each of the contracts calls for the construction of 50 ships, but the Government has the option of increasing this number from time to time as Congress may provide the necessary money.

The first of the three shipyards, which will be in the nature of assembling plants, is already in course of construction by the American International Corporation at Hog Island, Pa. The plant will cost about $20,000,000, will be financed by the Government on a cost-plus-profit basis and upon its completion will become the property of the United States. The Shipping Board will supply the fabricated steel for the vessels, which will also be built on a cost-plus-profit plan. The 50 ships ordered will be of 7500 tons cargo capacity and deliveries will begin in 10 months, the contractors agreeing to complete them within 16 months. They will cost approximately $150 per ton, or about $56,250,000. It is probable that, in the course of a few weeks a second order for ships will be given and that a few vessels of 9000 tons will be included in the second lot.

Provides for Plant

The contract with the Submarine Boat Corporation will cover the construction of a plant at Newark, N. J., at an estimated cost not far from that of the American International Corporation. Fifty ships of 5000 tons each have been ordered at an estimated cost of $150 per ton, or $37,500,000. The Government also holds an option from the Submarine Boat Corporation for additional vessels when the first lot are completed. The third plant will be built at Chester, Pa., the initial order being for 50 ships to be followed by others upon the passage by Congress of the pending urgent deficiency appropriation bill.

Both Chairman Hurley, of the Shipping Board, and Admiral Capps, general manager of the Emergency Fleet Corporation, are enthusiastic over the plans for the construction of fabricated ships and express the belief that this system will eventually revolutionize shipbuilding. The plans of the board for the construction and commandeering of foreign vessels promise to add to the American merchant marine between four and five million tons within the next 18 months. This will mean a 50 or 60 per cent increase in the total tonnage of vessels flying the American flag and represents no less than ten years' construction at the average rate of the past decade.

Destroyer Program

Relying upon the early passage of the pending appropriation bill, carying $360,000,000 for the new destroyer building program, the Navy Department has prepared tentative contracts with the Cramps, the Fore River Shipbuilding Co., the New York Shipbuilding Co., the Newport News Shipbuilding & Dry Dock Co., and the Union Iron Works at San Francisco, for the construction of 150 vessels to be built on a percentage basis. The margin of profit is still under consideration, but will probably be in the neighborhood of 10 per cent. To secure the necessary facilities for building the destroyers, all the plants which are to take contracts will require to be enlarged and this expense will be financed by the Government. Stipulations are now under discussion as to the disposition of the extensions after the war. The Navy Department will become responsible for the steel needed and will guarantee priority for the shipment of all material required.

It is understood that the Navy Department will specify standardized turbine engines and conferences are now being held with representatives of the General Electric and Westinghouse companies concerning the type and construction of the power units. It is stated that the Government will also provide the funds necessary to enlarge the plants of the concerns contracting for the engines, as existing facilities are inadequate and the department is very anxious to expedite the completion of the power units in order that there may be no delay in putting the destroyers in commission.

Victory for Bethlehem Steel Corporation

Vice-Chancellor Lane, at Newark, N. J., last week, vacated the injunction obtained by Clarence H. Venner and others to prevent the Bethlehem Steel Corporation voting on the issue of $30,000,000 common stock and $30,000,000 accumulative preferred stock. After going over the points that had been raised by Venner's counsel against the proposed transaction and the contentions with which they were met by counsel for the corporation, the court took occasion to criticise the complainant, Venner, as a man with a long history in the line which he pursued in the present case and as a "professional privateer."

The way having been cleared of legal objections, the stockholders, by a vote of 242,521 shares to 300, approved the plan for the issue of new stock. Charles M. Schwab, chairman of the board, voted in person 104,959 shares of both classes of stock, while the management voted 116,104 shares of both classes in proxies.

Canadian Locomotive Earnings

The Canadian Locomotive Co. Ltd., Kingston, Ont., during the 12 months ended June 30th last enjoyed the largest earnings in its history, most of which were derived from the manufacture of locomotives and locomotive parts and not from munitions.

The company's manufacturing profits during the past year totalled $721,254 90, and the net $616,254.90. This, with a balance of $304,322.42 brought forward from the previous year, gave $920,577.32 available for distribution. Out of this, $105,000 went in dividends on the preference shares, $25,000 was transferred to reserve for special replacements, $100,000 transferred to reserve for general depreciation and $15,000 added to the sinking fund. The balance carried forward to the current year was $690,577.32.

Will Resume Manufacture of Galvanized Sheets

CHICAGO, Sept. 19.—The Inland Steel Co. is to resume the manufacture of galvanized sheets, and announces it will be prepared to make deliveries about Nov. 1. Because of peculiar market conditions, only half of the company's galvanized sheet capacity will be used at the start. It has eight galvanizing pots and 14 sheet mills, of which six are new, while three more are to go on. Of the total of seven, four will be jobbing mills used for the heavier gages.

It is estimated that since the price of galvanized sheets went to abnormal levels, demand for them has been only about 50 per cent of normal, for the reason that substitutes replaced these sheets as a roofing material. The lower cost of various prepared roofings still causes them to be favored in the domestic market, but the export demand for galvanized sheets for roofing and other purposes has lately been growing.

The New England Westinghouse Co. has brought suit against the Crucible Steel Co. to collect $120,000, with interest from Aug. 5, 1915, which was paid as advance on a contract for 1,000,000 rifle barrels which it is claimed were never delivered. In its answer, filed Sept. 12, in the Federal District Court of New Jersey, the Crucible Steel Co. put in a counter claim for $800,000 for breach of contract on the part of the plaintiff. The contract price was fixed at 10 cents a pound for straight bars and 16 cents for barrel-shaped bars, and deliveries were to have been at the rate of 2500 barrels a day.

Machinery Markets and News of the Works

BIG BUYING FOR AIRPLANES

Government Places Orders for Plant in France

About 1000 Tools to Cost Nearly $3,000,000 Are Virtually Commandeered—Stone & Webster to Buy for Gun Repair Plant

Coincident with the announcement by the Secretary of War of the discovery of the Liberty airplane motor, which is expected to revolutionize aerial warfare, machine-tool builders last Thursday received telegrams from the J. G. White Engineering Corporation, 43 Exchange Place, New York, acting on behalf of the Signal Corps Equipment Division of the United States Army, to send representatives as early as possible to that address to submit propositions and enter into contracts for machine tools. More than 50 machine-tool men from out of town, in addition to resident New York representatives, presented themselves at the White corporation's offices and orders for about 1000 machine tools were given with a rapidity never before known in buying of such an important character. It is said that the purchases, which were made under the direction of an officer of the United States Army, will approximate $3,000,000. A company which received an order for about $100,000 worth of tools completed the whole transaction in less than one hour. This is an example of the speed with which the buying was done. Deliveries were demanded in many instances in 30 days, the tools being subject to commandeer process, if necessary.

It is understood that the Government will build 5000 Liberty motors in its plant in France. The J. G. White Engineering Corporation will erect the buildings. Fifteen thousand Liberty motors will be made in the United States. It is said that the Packard Motor Car Co. and Henry M. Leland & Son, Detroit, will each make 6000 and that the Trego Motors Corporation, New Haven, Conn., and the Nordyke-Marmon Co., Indianapolis, in co-operation with the Hall-Scott Motor Car Co., Oakland, Cal., will each make 1500. Parts for these motors will be manufactured in a number of plants; in fact, virtually every automobile factory will be utilized, according to information which has reached THE IRON AGE. The Liberty motor has previously been known as the U. S. A. motor, and though official announcement concerning it has just been made, it was perfected at least two or three months ago.

The General Vehicle Co., Long Island, N. Y., will make Gnome motors. Purchases of machine tools in this company's recent list have not been completed, but builders of tools have been requested to make reservations and formal buying will be concluded soon. The Trego Motors Corporation has bought quite heavily. The Simplex Automobile Co., New Brunswick, N. J., last week asked for a duplication of estimates on its recent list, but has not closed as yet for any tools.

Buying for a gun repair plant in France is to be done by the Stone & Webster Corporation, Boston, which has asked for bids by Sept. 19 on 359 tools, mostly engine lathes, boring lathes, grinding machines, horizontal drilling and milling machines, planers, boring and turning mills, radial drills, slotters, bolt cutters, etc. Deliveries are requested by Nov. 15, if possible, and not later than Dec. 31.

The Government has placed orders for 90 cranes, 30 locomotive and 60 of the gantry type, for terminal facilities in France. These orders were split up among a number of builders. Deliveries on one-third of the number are required by Oct. 15.

Aside from direct Government buying, there is a good volume of business, but most of it is for plants engaged on war equipment of some kind. The General Electric Co. has issued a list of 99 tools wanted for its West Lynn, Mass., plant. The Brazilian Navy is making miscellaneous purchases through a representative who makes his headquarters with Arkell & Douglas, 44 Whitehall Street, New York. Charles Hass, 50 East Forty-second Street, New York, has issued an inquiry for six milling machines for export to France. F. H. Lovell & Co., Arlington, N. J., have contracted to make powder cans for the United States Navy. The contract calls for about $1,500,000 worth of work and additional sheet-metal working machinery will probably be required.

The Poole Engineering & Machine Co., Baltimore, Md., has been buying in Philadelphia and New York for the machining of 4-in. guns. The Taylor-Wharton Iron & Steel Co. has placed additional orders for equipment for its Tioga plant, where gun forgings will be made for the Navy. Its total purchases now aggregate about $600,000. The Eddystone Steel Co., Eddystone, Pa., will soon buy machine tools and cranes. The Ingersoll-Rand Co. is buying for its Athens, Pa., plant.

Two lists have appeared in the Chicago market during the past week, one aggregating about $75,000 for the Beloit, Wis., plant of Fairbanks, Morse & Co., and the other of fair size for the Buda Co., Harvey, Ill. The Inland Steel Co., Indiana Harbor, Ind., is in the market for large lathes and other tools to cost about $50,000. The Holt Mfg. Co., Peoria, Ill., builder of caterpillar tractors, has placed a few orders, but has much more to buy. Government shell orders are expected soon in the Chicago territory and will doubtless precipitate a scramble for smaller sizes of machine tools.

There has been a good miscellaneous demand in Cleveland, mostly from makers of airplane parts, motor trucks and munitions, and the orders average from one to 10 tools. The Hampton Roads Shipbuilding & Dry Dock Co., recently organized, which will establish a plant at Norfolk, Va., has deferred buying equipment until expected Government contracts for ships are closed.

The American International Corporation, 120 Broadway, New York, and the Submarine Boat Corporation, 11 Pine Street, New York, will proceed at once with

the construction of yards for the fabrication of steel ships under the direction of the Emergency Fleet Corporation of the United States Shipping Board. After many weeks' delay, the contracts have been signed and accepted. Preliminary details for the yards have been arranged and no time will be lost in erecting shipways, shop buildings and in buying equipment necessary for the work.

Crane business continues active. The Tacony Ordnance Corporation has changed its recent list and will require only 14 cranes instead of 21, one of which is a 60-ton ladle crane. The Groton Iron Works, New London, Conn., has bought steel for shipways and will soon issue a list of its additional crane requirements. The Worthington Pump & Machinery Corporation has purchased three 5-ton cranes and one 10-ton crane for additions to its Harrison, N. J., works. George F. Pawling & Co., engineers, Philadelphia, have bought five 3-ton cranes for the Newfoundland Shipbuilting Co.'s plant at Harbor Grace, Newfoundland. The Foundation Co., New York, and the Buffalo Dry Dock Co., Buffalo, are in the market for cranes.

New York

NEW YORK, Sept. 18.

The J. G. White Engineering Corporation, 43 Exchange Place, New York, has been rapidly closing orders during the past several days for about $3,000,000 worth of machine tools. Orders for about 1000 tools have been placed under the direction of an officer of the United States Army. Many deliveries are required in 30 days, the machines all being subject to commandeer if necessary. They will be promptly shipped to France for an airplane motor plant, it being understood that the United States Government will make 5000 of the new Liberty motors in that country. Last Thursday morning machine-tool companies in all sections of the country received telegrams asking that representatives be sent promptly to New York to confer with the J. G. White Engineering Corporation. More than 50 outside men, in addition to those who make headquarters in New York, came here, as no orders were placed with agencies, factory representatives in all instances receiving preference.

Bids will be closed on Sept. 19 for 359 machines required by the Stone & Webster Corporation, Boston, for a gun repair plant in France. The tools are to be used for repairs to French field pieces, which the United States Army will use. The list includes engine lathes, boring lathes, grinding machines, horizontal drilling and milling machines, planers, boring and turning mills, radial drills, slotters, bolt cutters, steam hammers, coal forges, etc. Deliveries are requested by Nov. 15, if possible, and not later than Dec. 31.

The General Electric Co. is in the market again, having issued a list of 41 boring mills, seven planers, nine radial drills, one horizontal drilling machine, 16 milling machines, one slotter, 23 lathes and one punch press, mostly of large sizes, for its plant at West Lynn, Mass.

Orders have not been placed as yet by the General Vehicle Co., Long Island City, N. Y., on its recent list of about 900 machine tools, but builders have been requested to make reservations and the definite orders will probably soon be forthcoming. It is understood that the General Vehicle Co. will proceed with its original plan to make Gnome motors, despite the announcement of a new Liberty motor of a standardized type. Every available automobile factory in the country will be called upon, it is said, to make parts of the new Liberty motor. The Simplex Automobile Co., New Brunswick, N. J., has not bought yet, but has asked for a duplication of the estimates recently furnished on its list of about 100 machines.

The United States Government has given orders for 90 cranes, 30 of which are of the locomotive type and 60 of the gantry type. These are for two terminals in France. Orders were placed through Samuel M. Felton, who is in charge of railroad purchases. Delivery of about one-third of the cranes is required by Oct. 15, and the remainder soon thereafter.

General buying is good, the orders mainly being for one or two machines, but there are a large number of these. The Electro Dynamic Co., Bayonne, N. J., has not yet closed for all of the tools it recently inquired for. The Brazilian Navy is making purchases of machine tools, air compressors, cranes, etc., through a representative who makes his headquarters with Arkell & Douglas, 44 Whitehall Street, New York. Charles Haas, 50 East Forty-second Street, New York, has sent out an inquiry for six milling machines for shipment to France.

The Tacony Ordnance Corporation, which has closed contracts for a large part of its machine-tool equipment, has changed its list of cranes, and now asks for bids on 13 overhead electric traveling cranes, of 5, 10, 25 and 30-ton capacity and one ladle crane of 60-ton capacity. The former inquiry called for bids for 21 cranes. The Groton Iron Works, New London, Conn., has purchased steel for shipways and will soon issue a list of cranes to be bought. The Worthington Pump & Machinery Corporation, Harrison, N. J., has purchased three five-ton cranes and one 10-ton from the Pawling & Harnischfeger Co., Milwaukee. George F. Pawling & Co., engineers, Philadelphia, have closed for five three-ton cranes for the shipbuilding plant of the Newfoundland Shipbuilding Co., Harbor Grace, Newfoundland. The Foundation Co., New York, is in the market for a few small cranes. The Buffalo Dry Dock Co., Buffalo, N. Y., will buy several cranes.

Recent Government awards to F. H. Lovell & Co., Arlington, N. J., amounting to $1,500,000, necessitate further additions to their plant. Contracts for a considerable part of the work have been let to the David Henry Building Co. Lovell & Co. will make powder cans for the United States Navy. New sheet metal working machinery will probably be required.

The Downey Shipbuilding Corporation, 120 Broadway, New York, will erect a new machine shop, about 120 x 400 ft., to cost $75,000, at the former works of Milliken Brothers, Milliken, Staten Island, recently acquired for a shipbuilding plant. Plans have also been filed for the construction of five other buildings to cost about $88,000. Wallace Downey is president.

The Improved Motor Securities Co., New York, has been incorporated with a capital of $20,000 to manufacture internal combustion engines. D. C. Conkling, V. H. Hansen and H. Ferrari, 874 West End Avenue, are the incorporators.

The Doehler Die-Casting Co., Court and Ninth Streets, Brooklyn, N. Y., has had plans prepared for a one-story addition, about 42 x 290 ft., to cost $18,000.

The J. D. Johnson Co., 43 Boerum Place, Brooklyn, manufacturer of lead pipe, traps and plumbers' supplies, will build a one-story addition on State Street, about 50 x 100 ft., to cost $8,000.

The Runyon Corporation, New York, has recently been incorporated with a capital of $25,000 to do general foundry and machine shop work. A. W. Britton, S. B. Howard and G. V. Reilly, 65 Cedar Street, are the incorporators.

The Cosmopolitan Utilities Corporation, New York, has been incorporated with a capital of $50,000 to manufacture metal goods. I. L. Pasacal and L. Bonow, 309 Broadway, are the incorporators.

A four-story cold storage plant, about 60 x 100 ft., to cost $50,000, will be constructed on Hall Street by the Hutwelker & Briggs Co., 14 Hall Street, Brooklyn. G. M. Langdon, 103 Park Avenue, New York, is engineer.

The Yorkville Motor Co., New York, has been incorporated with a capital of $15,000 to manufacture motors and engines. W. Spiess, M. Kinsburg and R. Getzler, 1326 Lexington Avenue, are the incorporators.

The Johnson Shipyards Corporation, 515 Fifty-ninth Street, Brooklyn, N. Y., has increased its capital from $25,000 to $100,000.

The Interborough Rapid Transit Co., 165 Broadway, New York, has acquired property at 113 East Eighteenth Street, adjoining its power plant, for the erection of an extension.

The Pacco Vaporizer Corporation, New York, has been incorporated with a capital of $10,800 to manufacture vaporizing apparatus. M. Pruden and F. F. Pearz, 55 West Forty-fourth Street, New York, are the incorporators.

The Progressive Machine & Metal Products Co., 297 Water Street, New York, has leased property at 210-212 Canal Street for extensions.

The American Can Co., 120 Broadway, New York, is having plans prepared for the erection of a two-story addition, about 50 x 120 ft., to its plant on McWhorter Street, Newark, N. J.

The Onondaga Belting & Supply Co., Syracuse, N. Y., has been incorporated with a capital of $60,000 to manufacture belting. A. D. Page, V. V. Morgan and R. M. Langley, Syracuse, are the incorporators.

The Atlantic Stamping Co., 180 Ames Street, Rochester, N. Y., will build a one-story addition, about 45 x 98 ft.

The McKinnon Chain Co., Fremont Street, Tonawanda,

N. Y., manufacturer of iron chains, has awarded a contract for the erection of a one-story, brick and steel plant, about 80 x 145 ft.

The Buffalo Foundry & Machine Co., Fillmore Avenue and East Ferry Street, Buffalo, manufacturer of machinery and castings, has increased its capital from $500,000 to $1,500,000.

The Power Efficiency Corporation, 102 Clinton Street, Buffalo, operating a foundry at 419 Broadway, has increased its capital from $25,000 to $100,000.

The Buffalo General Electric Co., Buffalo, has filed plans for the erection of an addition to its power station on River Road.

The Reliance Air Brake Co., Buffalo, has increased its capital from $200,000 to $450,000.

The Niles-Bement-Pond Co., 111 Broadway, New York, has taken bids for the construction of a one-story, brick and reinforced-concrete power plant, about 89 x 108 ft., at its works at Plainfield, N. J.

The Walter Scott Printing Machine Co., South Avenue, Plainfield, N. J., has awarded a contract for the construction of three additions, 80 x 230 ft., 63 x 85 ft., and 20 x 43 ft., respectively, to cost about $100,000.

The New York Tool Mfg. Co., Alpine, N. J., has been incorporated with a capital of $25,000 to manufacture tools. B. S. Yankus, Alpine, and P. Turpeach, Brooklyn, N. Y., are the principal incorporators.

De Mattia Brothers, Garfield, N. J., machinists, will build a one-story foundry, about 70 x 80 ft., on Wellington Street, to cost about $9,000.

G. Grant Wilbur, New York, and B. Wright, Montclair, N. J., have incorporated in Delaware the Wilbur Mfg. Co., with capital of $200,000 to manufacture internal combustion engines.

The American Metal Treatment Co., Elizabeth, N. J., operating a plant for case hardening and tempering, is having plans prepared for a one-story addition, about 60 x 80 ft.

The New Process Rubber Co., 584 Bergenline Avenue, West New York, N. J., has been incorporated with a capital of $100,000 to manufacture automobile tires and inner tubes. John Berger and Tobias Schellenberger, Union Hill, and Reinhard Brueckner, West New York, are the incorporators.

The Metal Products Co., 790 Broad Street, Newark, N. J., manufacturer of taps, reamers, twist drills, etc., has removed its office to 32 Broadway, New York.

The Hay Foundry & Iron Works, Plum Point Lane, Newark, will erect a one-story building, about 40 x 100 ft., to cost about $7,500.

Fire, Sept. 10, destroyed a portion of the machine shops of Loy & Nawrath, 21-29 Runyon Street, Newark, with a loss estimated at $10,000. Joseph Svenson is superintendent.

The Newark Gear Cutting Machine Co., 69 Prospect Street, Newark, manufacturer of gear cutting machinery, is having plans prepared for a new four-story machine shop, pattern department and office building, about 42 x 50 ft., on Prospect Street. Henry E. Eberhardt is president. The F. H. Ogden Co., Union Building, is engineer.

Philadelphia

PHILADELPHIA, Sept. 18.

The Poole Engineering & Machine Co., Baltimore, appeared in this market last week as a buyer of big tools for work on 4-in. guns. The Taylor-Wharton Iron & Steel Co., which has received a Government contract to build naval guns at its Tioga plant, Philadelphia, has placed additional equipment orders, its total purchases now aggregating about $600,000. The Ingersoll-Rand Co. is buying for its plant at Athens, Pa., where it is said to be doing Government work. The Eddystone Steel Co., Crum Lynne, Pa., expects to come into the market shortly for cranes and machine tools. The Frankford Arsenal continues as one of the largest purchasers in Philadelphia or vicinity, and is now buying for a new fuse plant. The Standard Fuse Corporation, Paulsboro, N. J., has a French Government fuse contract, but will probably not need additional equipment. The Harris Engine Co., Wilmington, Del., has been reorganized and will buy new equipment for the manufacture of marine engines.

The John Whitaker Mfg. Co. will consolidate its Philadelphia and North Wales, Pa., factories at Lansdale, Pa., where it has leased a two-story building. The company manufactures adding machines.

The Midvale Steel Co., Widener Building, Philadelphia, has awarded a contract for the erection of a two-story machine shop, 112 x 210 ft., at its Nicetown works.

The Lutz Co., 3111 Grays Ferry Avenue, Philadelphia, manufacturer of machinery and parts, will build a one-story extension, about 40 x 88 ft.

The Supplee Biddle Hardware Co., Commerce Street, Philadelphia, is having preliminary plans prepared for the erection of a new factory. Purcell & Elmslie, 122 South Michigan Avenue, Chicago, are the architects.

The Henry Sheip Mfg. Co., Sixth Street and Columbia Avenue, Philadelphia, is taking bids for the erection of an addition to its power plant.

William Pilton, 5832 Ashland Street, Philadelphia, will erect an addition to his machine shop at Sixtieth Street and Larchwood Avenue.

The Bureau of Yards and Docks, Washington, D. C., has had plans prepared for the erection of a new power plant at its local yard to cost about $45,000.

The White Motor Car Co., Philadelphia, is having plans prepared for a new one-story building, about 250 x 300 ft., at Twentieth and Erie Avenues.

The Atlantic Auto Radiator Co., Philadelphia, Pa., has been incorporated in Delaware with a capital of $50,000 to manufacture automobile parts. Harry G. Goodman, Joseph Carmin and C. M. Hogarth, Philadelphia, are the incorporators.

Dougherty & Bachram, North American Building, Philadelphia, manufacturers of scales, will build a one-story addition to their plant at 1620 Washington Street, about 22 x 32 ft. Contract has been awarded.

A one-story power house, about 35 x 44 ft., will be erected by the Girard Point Storage Co., Philadelphia, at Twenty-sixth Street and Forty-fifth Avenue, to cost $31,000.

The Olson Testing Machine Co., 1204 Nectarine Street, Philadelphia, will build an addition to its plant.

A one-story power plant, 30 x 60 ft., will be erected by the Treen Box Co., Memphis and Tioga Street, Philadelphia.

The Baldwin Locomotive Works, Philadelphia, has awarded a contract for the construction of a new shop at Fifteenth and Spring Garden Streets to cost about $60,000. The company recently established a new record in the completion of an average of nine locomotives a day.

The William Cramp & Sons Ship & Engine Building Co., Philadelphia, has received a Government contract for 15 destroyers, similar to eight vessels now under way, at a cost of $19,000,000.

The J. G. Brill Co., Woodland Avenue and Sixty-second Street, Philadelphia, manufacturer of cars and car wheels, etc., will build a new one-story shop addition, about 100 x 120 ft. Contract has been awarded.

The New York Shipbuilding Co., Camden, N. J., will erect a one-story building, about 64 x 96 ft., at Fairview Street and Broadway.

Joseph Palese, 302 Spruce Street, Camden, will build a new one-story machine shop at 710-12 South Second Street.

The Chester Shipbuilding Co., Chester, Pa., has purchased a block of land bounded by Front, Second, Ulrich and Lloyd Streets, for proposed extensions.

The Jacob Wilson Estate, Easton, Pa., operating a foundry on Delaware Street for the production of iron and steel castings, has awarded a contract for the construction of a one-story addition, 60 x 130 ft., and 35 x 60 ft., to cost about $35,000. J. Wilson Harrison is manager.

The Steacy Schmidt Mfg. Co., 230 Hay Street, York, Pa., manufacturer of cars, car wheels and machinery, has commenced the erection of a new foundry on Queen Street for iron and steel castings. It has been making extensions to double its former capacity and has purchased the plant formerly occupied by the Spangler Mfg. Co.

The Bethlehem Steel Co., South Bethlehem, Pa., has commenced the erection of a one and two-story addition, about 200 x 980 ft., to be used as a machine shop and armor working plant.

The Frog, Switch & Mfg. Co., Carlisle, Pa., manufacturer of railway frogs and switches, is planning for the erection of an addition to its plant, for extensions in the manganese department.

The Carlisle Tire & Rubber Co., Carlisle, recently organized, has leased a local factory which it will equip and plans to begin operations about Jan. 1. Charles S. Moomey, formerly vice-president of the Keystone Rubber Mfg. Co., Erie, heads the company.

The Frick Co., West Main Street, Waynesboro, Pa., manufacturer of agricultural implements and machinery, will build a two-story addition, about 60 x 90 ft., for the manufacture of gas tractors.

The Standard Steel Works Co., Burnham, Pa., manufacturer of car and car wheels, is arranging for the immediate installation of equipment for gun forging work and will specialize in the production of forgings and rough borings for 6-in. guns.

The Industrial Foundry & Machine Co., Laurel and Wash-

ington Streets, Pottstown, Pa., has commenced the erection of a new pattern shop. It has inaugurated operations for the manufacture of automobile accessories, including engine parts. George A. Mohn is president.

The Light Mfg. & Foundry Co., Pottstown, Pa., manufacturer of aluminum goods, is planning for the erection of an addition. E. S. Fretz is president.

The Johnstown Traction Co., Johnstown, Pa., is having plans prepared for the erection of a new car repair plant at Coopersdale. George N. Smith is chief engineer.

The New Castle Construction Co., New Castle, Del., having completed its Russian order for shells, has closed its plant.

The Bower Auction Co., Media, Pa., has purchased a five-acre tract along the Pennsylvania Railroad, and has begun the construction of a plant for the manufacture of anchors.

Baltimore

BALTIMORE, MD., Sept. 17.

Mayor James H. Preston has launched an energetic campaign to have the Government establish one of its shipbuilding plants here and also to have capitalists interest themselves in some of the yards already established with the view to securing contracts for them. As a step along this line he has sent out letters to leading men. The plants mentioned in this connection are the Mann Shipbuilding Co., Henry Smith & Sons and the Coastwise Shipbuilding Co.

The Coale Muffler & Safety Valve Co., 325 East Oliver street, Baltimore, will erect a two-story building, 32 x 40 ft. The contract has been awarded to Gladfelter & Chambers, Thirty-sixth Street and Roland Avenue.

The first unit of the plant of the Westinghouse Electric & Mfg. Co., Essington, Pa., is expected to be in operation by Jan. 1, employing about 5000 men. By the middle of 1918 about 22,000 will be employed. Steam machinery and turbines will be the first products.

The Maryland Metal Cross Tie Co., Munsey Building, Baltimore, Md., is having plans prepared for a new one-story building, about 200 x 400 ft., to cost $100,000. Thornton W. Price, Woolworth Building, New York, is the engineer.

The McNamara Brothers Co., Ransteads Wharf, Baltimore, Md., manufacturer of boilers, tanks, etc., has awarded a contract for the erection of a new plant on Bush Street to cost about $15,000.

Paul W. Custer, Cumberland, Md., associated with the United States Sales Service Corporation, is organizing a company to establish a local brass working plant, including rolling mill and other departments.

The Richmond Engineering Co., Richmond, Va., manufacturer of sheet metal specialties, is planning for the erection of a two-story, brick and steel addition.

The Eastern Shore Shipbuilding Co., Sharptown, Md., recently incorporated with a capital of $500,000, is planning for the operation of a local shipbuilding plant.

New England

BOSTON, Sept. 17.

Machine tool builders are working at highest speed to keep up with the demands for their product, but are themselves buying little new equipment. General machinery makers are in the market for some new equipment, but large orders or inquiries originating in New England are the exception. The Blake & Knowles works of the Worthington Pump & Machinery Corporation have a good-sized inquiry out for equipment for an addition. The company is busy making pumps for shipbuilders and if certain contracts which local ship builders expect materialize, a further enlargement of the Blake & Knowles works is expected to follow. The Watertown Arsenal has recently added two 42-in. and two 36-in. lathes.

The United States Airplane Co., recently organized in Delaware, has purchased a site in Bridgeport, Conn., and will build a plant for the construction of airplanes, engines and for a school of instruction in flying. The first building is to be ready for operations in 30 days and it is reported that the equipment is ready for delivery. The company will build a new type of engine which is said to develop 1 hp. per lb. of weight and to be rated at nearly 350 hp. It is expected that an announcement of officials will be made this week. The first unit of the plant will be a factory 100 x 300 ft., one story, and the entire cost of the buildings projected and their equipment will be about $500,000.

The Federal Stoker Co., Boston, has been incorporated with authorized capital stock of $100,000. John J. Hammers is president and Albert H. Wright, 50 Saville Avenue, Quincy, treasurer.

The Groton Iron Works, Groton, Conn., has begun the erection of a building, 150 x 350 ft., one and two stories.

The Colt's Patent Fire Arms Co., Hartford, Conn., is receiving bids on a forge shop, 40 x 225 ft., one story.

The American Chain Co., Bridgeport, Conn., announces plans for the erection of two buildings at Norfolk, Va., one 60 x 305 ft., and the other, 56 x 506 ft. Both are to be ready for occupancy in 80 days and will cost about $250,000. The company has received Government contracts for heavy anchor chains.

Work is well under way on an erecting shop and other buildings at the Watertown Arsenal, Watertown, Mass. The contract calls for the expenditure of about $500,000.

The Waterbury Buckle Co., Waterbury, Conn., is to build three additions, 16 x 34 ft., 14 x 27 ft., and 14 x 20 ft., one story.

The Donnelly Iron Works, Lowell, Mass., has been incorporated with authorized capital stock of $10,000. Frank A. Donnelly is president and treasurer.

The Fitchburg Engine Co., Fitchburg, Mass., has received a Government contract to build 18 marine engines, to be completed by Jan. 1, 1919. Additions are being made to increase the capacity of the plant.

The Millbury Steel Foundry Co., Millbury, Mass., has awarded a contract for an addition, 50 x 64 ft., and for a building to be devoted to pattern storage and office. A 2-ton Heroult furnace is being installed. The changes under way will enable the company to double its present working force of 60 men.

The Housatonic Shipbuilding Co., Bridgeport, Conn., awarded a contract for 10 wooden ships as noted last week, has erected a machine shop and four ship ways and has six more ship ways under construction. The officers are Simon Lake, president; Thomas L. Lake, vice-president; Kenneth W. McNeil, secretary; Carl Foster, treasurer, and Foster L. Kawkins, general manager.

The Government is soon to ask bids on the erection of five ordnance buildings and a machine shop at New London, Conn.

The Trego Motors Co., New Haven, Conn., has awarded a contract for a testing building, 51 x 51 ft., and work on the building has begun.

The Bantam Ball Bearing Co., Bantam, Conn., has awarded a contract for an addition to its machine shop, 42 x 80 ft., two stories.

The Fellows Gear Shaper Co., Springfield, Vt., is to build an addition, 72 x 170 ft., two stories.

The Scovill Mfg. Co., Waterbury, Conn., has awarded a contract for a pattern building and garage, 62 x 216 ft., four stories.

The Wyman-Gordon Co., Worcester, Mass., is to build an addition 40 x 100 ft., one story.

The Lombard Machine Co., Worcester, has awarded a contract for a three-story building to replace one recently destroyed by fire.

The Bush Mfg. Co., Hartford, Conn., has increased its capital stock from $39,700 to $125,000. No new building operations are contemplated but the working force will be largely increased. The principal product of the company is radiators for tractors, commercial cars and aeroplanes.

The Wright Wire Co., Worcester, is to build an 80-room hotel for employees of its Palmer, Mass., plant.

The Connecticut Brass Foundry Co., Waterbury, Conn., has been incorporated with capital stock of $3,500. The incorporators are Franklin W. Cohen and Samuel J. Lifty, both of Ansonia, and Henry L. and Benjamin Silver, Waterbury.

The Fitzgerald Mfg. Co., Winsted, Conn., has had plans drawn for an addition, 100 x 140 ft., one story.

The Winchester Repeating Arms Co., New Haven, Conn., has bought a large tract of land adjoining its present plant.

The Hendey Machine Co., Torrington, Conn., has secured a permit for the erection of an addition, 65 x 160 ft.

Wood & McClure, yacht builders, City Island, N. Y., who some time ago purchased a part of the plant of the Holmes Motor Works, Mystic, Conn., have bought the machine shop formerly owned by the Holmes Co. and a strip of land extending back 100 ft. from the water front. It is reported that repair work on Government vessels will be undertaken.

The American Thermos Bottle Co., Norwich, Conn., has purchased additional land on which a building to cost $50,000 will be erected.

The North Dighton Stove Co., Taunton, Mass., has been incorporated with authorized capital stock of $40,800. Daniel Crotty is president and John P. Dary, 23 South Street, treasurer.

The Athol Homes Corporation, Athol, Mass., has been organized with capital stock of $150,000 to build workingmen's homes. John A. McGregor, president Union Twist Drill Co., is president, and Frank E. Wing, treasurer. L. S. Starrett Co. is treasurer.

Henry Fletcher and Joseph P. Burlingame were appointed receivers of the Metal Products Corporation, Providence, R. I., on Sept. 11. The company specialized in the automatic production of drawing, forming, piercing and blanking work.

Chicago

CHICAGO, Sept. 17.

Two lists have come to the attention of the trade, one embracing several large tools wanted by Fairbanks, Morse & Co., for delivery at their Beloit, Wis., plant, the value of which will be close to $75,000; and another of fair size to be purchased by the Buda Co., Harvey, Ill. The headlight department of the latter company will fulfill a Government order for which the tools are needed. The Inland Steel Co., Indiana Harbor, Ind., is in the market for large lathes, a big gear-cutting machine and a tool-room grinder, the aggregate cost of which will be about $50,000. The scarcity of large tools is so acute that some dealers are not able to bid on some of the machines wanted. The Chicago & Northwestern Railway Co. has taken estimates on three machines, a belt-driven 42-in. upright drill press; 30-in. lathe, 10 ft. between centers, and a single crank planer, 24 in. x 6 ft.

The Holt Mfg. Co., Peoria, Ill., has placed a few odd orders, but has much more to buy. Its activities have been seriously impeded by labor troubles. The Stone & Webster Corporation, Boston and New York, has sent to some Western representatives of tool builders a large list of machines for shipment to France, with the request that quotations be f.o.b. Newport News, Va. Dealers can do little or nothing with the list for territorial reasons.

While purchasing of odd tools forms a good aggregate, it is notable that little buying is being done by the smaller jobbing shops and manufacturers, for the reason that prices of both new and second-hand machines are so high that the man with a small capital does not purchase unless the most urgent need exists. The scarcity of many tools is another deterrent factor to activity. Many of the new and second-hand machines in warehouses have already been sold, but are being held for future delivery. The most difficult to secure are large boring mills, heavy gear cutting, planing, horizontal boring and radial drilling machines.

It is predicted by excellent authority that the placing of Government shell orders in and near Chicago is not far distant, whereon a scramble for the smaller sizes of machine tools will take place. Local sellers continue to derive considerable business from the Wisconsin Gun Co., the Harley-Davidson Motor Co. and other Milwaukee interests.

The Linden Ice Machine Co., 2640 Holly Avenue, Chicago, has started work on a two-story mill construction shop, 49 x 100 ft., at 4849 and 4851 Grand Avenue, to cost $15,000. Charles Kophamer, 601 North Homan Avenue, has the contract.

The contract for an additional one-story foundry, 60 x 120 ft., at 2119 to 2123 Carroll Avenue, Chicago, for the Monighan Foundry Co., has been awarded to F. E. Doherty, 133 West Washington Street, Chicago.

Charles W. Secord, 417 West 117th Street, has been awarded the general contract for a one-story factory, 90 x 123.5 ft., to cost $30,000, to be erected for the Belden Mfg. Co., 2300 South Western Avenue. It is to be a section of a plant that ultimately will cost $100,000.

Plans have been drawn for a foundry, 75 x 100 ft., at Fulton and Curtis Streets, Chicago, for H. G. Lang, 162 North May Street.

The Union Specialty Machine Co., 300 West Kinzie Street, Chicago, is planning the construction of an eight-story factory.

The Interstate Brass Co., Chicago, has been incorporated with a capital of $10,000 by Maxwell L. Herman, A. L. Epstein and Morris Lasdon, 1325 Turner Avenue.

The Metal Produce Co., Chicago, has increased its capital stock from $5,000 to $20,000, and changed its location from 1749 Grace Street to 100 South Jefferson Street, Chicago.

The Illinois Steel Co. has taken out a permit for a one-story brick extension to a machine shop, 69 x 160 ft., to be erected at Eighty-seventh Street and Mackinaw Avenue, South Chicago, at a cost of $40,000. Leonard C. B. Holmbee is the architect.

Peter W. Meyn of Gostlin, Meyn & Co., has sold approximately 32 acres of land at Hammond, Ind., on which a plant for the construction of tank cars is to be built. The identity of the company has not been disclosed but it is said to be an established one, and plans building at once.

The Western Electric Co. will erect a one-story brick factory at 4537-39 West Twenty-second Street, Chicago, at a cost of $30,000. Walter R. Kattelle is the architect.

The Bradwield Sales Co., Peoria, Ill., has been incorporated with a capital of $25,000 by J. S. Bradfield, T. Bradfield and H. S. Bradfield. It will manufacture automobile parts, accessories, complete machines, and will transact other business incidental thereto.

The Comet Automobile Co., Decatur, Ill., has started the construction of its new plant which, when completed, will cost approximately $140,000. The first unit will be 150 x 600 ft., running north and south along the Illinois Central and Vandalia railroads. It will be one-story, of concrete and steel, while the front section will be two stories and will contain the administrative offices. An office building will also be erected south of the factory.

The Merrill-Higgins Co., Omaha, Neb., has been incorporated with a capital of $100,000 by H. B. Merrill, E. A. Higgins and C. J. Miller, to manufacture stoves, furnaces, heating plants and heavy hardware.

The Republic Phonograph Co. of Illinois, Chicago, has been incorporated in Delaware with a capital of $250,000 to manufacture phonographs. L. L. and B. F. Cowan and P. Zak are the incorporators.

The Moline Forging & Mfg. Co., Moline, Ill., has awarded a contract for the erection of a one-story addition to its plant, about 110 x 260 ft.

The Union Drawn Steel Co., Gary, Ind., specializing in the production of high grade steel for tools, has placed its new plant in operation, which has been in course of construction for the past year. It is expected to install additional machinery to run at full capacity within the next month, with the employment of about 500 hands.

Milwaukee

MILWAUKEE, WIS., Sept. 17.

Contracts and orders for a vast variety of material for Government purposes are coming in so rapidly that the metal-working industry is being taxed to a degree never before known. The immediate problem is to find facilities sufficient to handle all the business, a considerable volume of which has been turned away, because there is no hope that required deliveries can be met. Manufacturers of internal combustion engines for automobiles, trucks, tractors and airplanes are finding it difficult to produce the number required by their bookings. The present metal-working capacity is perhaps twice as large as it was a year ago, yet facilities are lacking to meet all demands.

The Kempsmith Mfg. Co., Milwaukee, maker of milling machines, has awarded contracts for the erection of another shop extension, 102 x 200 ft., of brick, steel and reinforced concrete, with sawtooth roof, which, together with additions erected the past eight months, will more than treble the capacity.

The Cutler-Hammer Mfg. Co., Milwaukee, manufacturer of electric controlling devices, expects to begin work within 10 days on the construction of the second unit of its new plant at Twelfth Street and St. Paul Avenue, which eventually will cost about $1,250,000 and involve the replacement of practically all structures comprising the old works. The first unit is now ready for occupancy. Each unit will be 50 x 200 ft., seven stories and basement, of reinfored concrete. A. W. Berresford is vice-president and general manager.

The Standard Crucible Steel Castings Co., 719 Thirtieth Street, Milwaukee, will erect a one-story foundry addition, 30 x 60 ft., of brick and reinforced concrete. Theodore F. Schutz is the architect.

The Falls Motors Corporation, Sheboygan Falls, Wis., has taken a contract for furnishing cylinder castings and other parts for 5000 airplane motors to the Curtiss Airplane Co., delivery to begin Sept. 22. The company recently doubled its capacity and is employing more than 600 men.

The United States Switch Co., a Delaware corporation with $1,750,000 capital stock, which has been granted a Wisconsin charter, will establish a plant in Eau Claire, Wis., to manufacture automatic railroad and electric railroad switches and other equipment, appliances and safety devices. It has purchased the former plant of the Eau Claire Mfg. Co. and five acres of ground, and will award contracts at once for several buildings. The officers are: President, James W. Hubbard, Eau Claire; vice-president and general manager, T. C. Hadley, Atlanta, Ga.; executive committee, N. J. Whelan, J. J. Ott, R. B. Gillette, F. E. Nicoles and R. L. Meader.

The Universal Motor Co., Oshkosh, Wis., manufacturing electric lighting units for army trucks, field machine-shops, farms, etc., will increase the capacity of its plant from 75 to 100 per cent by the erection of a two-story addition, 40 x 165 ft. The owners of the company recently organized the

Universal Foundry Co., Oshkosh, which is operating a shop to provide castings for the motor company and other consumers.

The Milwaukee Tank Works, 851 Kinnickinnic Avenue, Milwaukee, has increased its capital stock from $25,000 to $100,000. It manufactures light and heavy sheet steel tanks, stacks, etc., and has been enlarging its facilities the last four or five months. R. L. Bienenstok is president.

The Cluley Multiplier Co., Green Bay, Wis., has suspended production of its multiplying machines pending important developments in the design, and is occupying its facilities at present by the manufacture of automobile accessories and specialties, which include jacks, tire pumps, superheated manifolds, tire meters, headlight reflectors, dimmers, etc. John P. Cluley is vice-president and general manager.

The American Auto Body Co., 531 Caswell Block, Milwaukee, will expend about $80,000 in the construction and equipment of a frame and metal-working plant, four stories, 100 x 300 ft., of reinforced concrete, brick and steel. David J. Borun is treasurer.

The West Bend Aluminum Co., West Bend, Wis., is taking bids this week for the erection of additions costing $75,000. The plans call for a three-story reinforced concrete shop, 72 x 190 ft., and a one-story wing, 50 x 60 ft.

The Davis Mfg. Co., Milwaukee, gasoline engine manufacturer, has awarded the general contract for the erection of a new core building, 92 x 100 ft., to the Robert L. Reisinger Co., First National Bank Building, Milwaukee. The company is completing work on a large foundry and machine-shop addition, to be served by the new core building. Frank M. Davis is president and general manager.

The A. E. Martin Foundry & Machine Co., 705-723 Park Street, Milwaukee, is making a number of additions and erecting a new office building costing $5,000.

Detroit

DETROIT, Sept. 17.

A great increase in the number of machine tools booked was noted in the past week and in addition many inquiries were received for large orders. Dealers state that the fall business has opened with more of a rush than was anticipated, due to many companies enlarging their plants.

The general manufacturing business in this district is very good, brass, copper, aluminum and iron-working plants working to capacity. Shipbuilding companies are unable to keep up with orders and despite reports to the contrary pleasure car manufacturers are well supplied with orders. Banks are growing more conservative on loans and as a result new industries are not being formed as rapidly as formerly.

The plant of the Standard Screw Products Co., Bellevue and Warren Avenues, Detroit, was destroyed by fire Sept. 12 with an estimated loss of $400,000. It was engaged in turning standard machines for the United States Government, and more than 400 men are thrown out of work.

The Air-O-Flex Automobile Corporation, 570 Penobscot Building, Detroit, has announced it will manufacture a 1½-ton flexible suspension truck. The company was incorporated in Delaware, with an authorized capitalization of $2,500,000. E. M. Walker, Jr., is president, and Mr. Kreis, research engineer of the Continental Motor Co., is vice-president and chief engineer.

The Landover Motor Truck Co. will occupy the plant of the Marinette Iron Works, Marinette, Mich. Machinery will be installed and operations will begin shortly.

The Muskegon Engine Co., Muskegon, Mich., capitalized at $150,000, will begin the manufacture of a 2-ton truck Oct. 1. C. E. Johnson is president and general manager. J. A. Mohrhardt, vice-president, and L. H. Shuh, secretary and treasurer.

The plant of the Duplex Truck Co., Grand Rapids, Mich., will be completed by Nov. 1. It is 72 x 402 ft., with a wing 72 x 306 ft., two stories, and will have a capacity of 75 trucks per month. H. M. Lee is general manager.

The Kuhlman Electric Co., Bay City, has completed plans for the construction of additions to its plant.

The Flottorp Mfg. Co., Chicago, manufacturer of aircraft propellers, will move to Grand Rapids, where increased capacity has been secured. It has a large Government contract and operations will begin within 30 days.

The Grand Rapids Textile Machinery Co., Grand Rapids, Mich., has completed a new factory and has awarded a contract for a power house to cost $8,000.

The Clipper Belt Lacer Co., Grand Rapids, Mich., is building a power house at a cost of $8,000.

The Fisher Body Corporation, Detroit, will erect a one-story steel frame factory, 100 x 560 ft., and 23 ft. high, for use of its airplane division at an estimated cost of $200,000.

The Henseler Trolley & Mfg. Co., Holden Avenue, Detroit, will build a new one-story machine shop and foundry, about 35 x 150 ft. E. J. Fezzey is manager.

Indianapolis

INDIANAPOLIS, Sept. 17.

The plant of the Peerless Wire Works, Lafayette, Ind., recently destroyed by fire will be rebuilt. Contract has been let for two buildings, 26 x 70 ft., and 28 x 70 ft., respectively, giving 8000 ft. of floor space.

The Hammond Malleable Iron Co., Hammond, Ind., has increased its capital stock from $75,000 to $150,000.

The Jay-Vee Differential Co., Indianapolis, has increased its capital stock from $110,000 to $125,000.

G. A. Robinson, Anderson, Ind., has disposed of his interest in the Standard Plating & Brass Co., and will devote his entire attention to the manufacture of brass and aluminum castings. He is building a new foundry, 30 x 100 ft., especially for this purpose at Sixth Street and the Big Four Railroad, work on which is well under way.

It is reported that the Pennsylvania Lines West will build car-repair shops and other terminal facilities at its new yards now under construction at Richmond, Ind., to cost $250,000.

Cleveland

CLEVELAND, Sept. 17.

Machinery dealers report a good volume of orders for single tools and for lots up to 10 machines. The demand is mostly from makers of airplane parts, munitions and motor trucks. Some inquiry for large machines for gun plants is still pending. The Hampton Roads Shipbuilding & Dry Dock Co., Cleveland, which contemplates building a plant at Norfolk, Va., has deferred the purchase of shipbuilding equipment until it secures expected Government contracts for boats. Among orders placed the past week was one by a local company for a number of machines for a new tool room. Automatic screw machinery in small lots is in fairly good demand, but no large inquiries are pending. The demand for standard screw machine products for Government work is heavy. Many manufacturing plants in this section have Government orders on their books and much additional work of a miscellaneous character is coming out.

The Westinghouse Electric & Mfg. Co., Cleveland, will build a malleable iron foundry, 160 x 260 ft., in connection with its gray iron foundry, which will be used particularly for Government work. The plant will be equipped with two air furnaces and other required equipment, including annealing ovens and molding machines, none of which has yet been purchased. A second building will be erected to be used as a machine shop.

The Cleveland Brass & Copper Mills, Inc., Cleveland, placed its new plant partially in operation this week. It will have a monthly capacity of about 3,000,000 lb. of sheet brass and rods and is starting with about one-fifth of full capacity which will be increased as remaining sections are ready for operation.

The Lakewood Engineering Co., Cleveland, has purchased the plant of the Galion Dynamic Motor Truck Co., Galion, Ohio, which it will use for the manufacture of storage battery trucks and trailers, with a four wheel steer and four wheel drive. An extension will be built as soon as plans can be prepared. In addition to this and its Cleveland plant the company now owns and operates works in Elyria, Ohio, and Milwaukee.

The Austin Co, Cleveland, has recently taken contracts for an addition 50 x 420 ft. for the Frankford Asenal and for a new building for the Dow Chemical Co., Jackson, Mich., and the Worthington Pump & Machinery Co., Cincinnati.

The Reliance Electric & Engineering Co., Cleveland, has increased its capital stock from $180,000 to $600,000. No extensions are contemplated.

Brennan & McBride, 6719 Carnegie Avenue, Cleveland, will erect a two-story building, 50 x 120 ft., to be occupied partly by a machine shop for automobile repair work.

The Kilby Mfg. Co., Cleveland, is making some changes and improvements to its plant which will increase its machine shop capacity.

The Manufacturers' Brush Co., Cleveland, has purchased a site on West 114th Street, where it contemplates erecting a new plant next spring.

The J. C. Ulmer Co., Cleveland, will erect a two-story factory at East Thirty-eighth Street and Kelly Avenue to cost $20,000. Plans have been prepared by the Poe Engineering Co.

The American Auto Trimming Co., Cleveland, has acquired a two-acre site adjoining its plant on East Seventy-second Street, and it is reported, plans the erection of a factory addition.

The Toledo Machine & Tool Co., Toledo, Ohio, is having plans prepared for its new foundry and is expected to pur-

chase equipment shortly. It will probably be equipped with two cupolas, with a daily melting capacity of about 50 tons, and designed to make large gray iron castings used in the manufacture of the company's line of presses, which are now furnished by outside foundries.

The Smith Gas Engineering Co., Lexington, Ohio, is building gas producer plants for use in connection with heat treating furnaces for the Jeffery Mfg. Co., Columbus; Timken Roller Bearing Co., Canton, and the Reliance Mfg. Co., Massillon, Ohio, and several units for the Ford Motor Co., Detroit, where it installed two 6-section plants several months ago.

The Burt Mfg. Co., Akron, Ohio, has received an order for 125 24-in. Burt ventilators and bases to provide fresh air in the quarters of the army in France. The company has shipped 50 ventilators for use at Camp Fort Benjamin Harrison at Indianapolis.

Cincinnati

CINCINNATI, Sept. 17.

If all inquiries now being figured on should develop into orders it would be impossible for local machine tool builders to catch up with the demand in over a year. The majority already have sufficient business in hand to keep their plants in full operation several months ahead. Inquiries are from steel mills, shipbuilders and manufacturers of internal combustion engines. The railroads are not buying any machines except for replacement.

The Niles Tool Works Co., Hamilton, Ohio, is again having trouble with its molders. The foundry was started last week, but was compelled to close the second day. The question at issue is simply a demand for recognition of the union. A temporary Federal injunction against the strikers was obtained last week and the case will be heard in Cincinnati Sept. 24.

Airplane makers have bought machine tools quite heavily in this market, including sensitive drilling machines, etc. It is stated that much more business from this source is expected to come to light within a few days.

It is reported that the B. A. Wesche Electric Co., Cincinnati, maker of small electric motors and generators, has plans under way for a new factory that will enable it to double its output.

The Recording & Computing Machine Co., Dayton, Ohio, it is reported, has received a large Government order for war munitions. Its present plant was built to make shell detonating devices for the Allies.

It is reported that the International Harvester Co. will enlarge its plant at Springfield, Ohio, to engage in the manufacture of farm tractors and motor trucks. Heretofore the plant was operated almost entirely as a foundry.

The addition to the plant of the Kelly-Springfield Motor Truck Co., Springfield, Ohio, will soon be under cover and ready for the necessary equipment.

The Victor Rubber Co., Springfield, Ohio, will build an addition to its plant. W. H. Christman is the architect.

The addition to the plant of the Springfield Metallic Casket Co., Springfield, Ohio, will be 62 x 150 ft., three stories, of brick, concrete and steel. J. A. Poss has been awarded the contract.

The Portsmouth Supply & Mfg. Co., Portsmouth, Ohio, is removing to a new building on Gallia Street.

The Mt. Vernon Foundry & Engineering Co., Mt. Vernon, Ohio, has been incorporated with $100,000 capital stock by James J. Sexton and others.

The Central South

LOUISVILLE, Sept. 17.

Numerous orders, delayed on account of high prices, are now being booked by local machinery manufacturers. Ice-making machinery is unusually active. Dealers report a big demand for hoisting engines, while a dearth of casings and other supplies needed by the oil well industry continues. Skilled labor is difficult to obtain.

The Vogt Brothers Mfg. Co., 1402 West Main Street, Louisville, is in the market for a second-hand, 15-ton alternating-current electric crane, to span 40 ft. 3 in. and to lift 25 ft., for immediate delivery.

The Standard Sanitary Mfg. Co., Pittsburgh and Louisville, has taken over the Ahrens & Ott Mfg. Co., Louisville, which will be known as the Ahrens & Ott Division of the Standard Sanitary Mfg. Co. It will continue to handle plumbers' supplies and fixtures and steam fitters' and machinists' supplies.

Fire, Sept. 13, destroyed the pumping plant of the municipal waterworks at Harrodsburg, Ky., with the exception of the boilers.

The John G. Duncan Co., Knoxville, Tenn., is asking for dealers' prices on two 150-hp. return tubular boilers, of 125 to 150 lb. working pressure, with complete data; and prices on a second-hand steam pump, 4½ or 5-in., to pump water 220 ft. high, in good condition and for immediate shipment.

The Central Iron & Metal Co., Louisville, Ky., has been incorporated with a nominal capital of $5,000 to manufacture metal specialties. Herman and Benjamin B. Kort are the principal incorporators.

Texas

AUSTIN, Sept. 15.

It is expected that the new conservation law of the State, which will be passed by the Legislature, will cause a great impetus to irrigation and drainage projects and will create a big demand for machinery.

The Hughes Tool Co., Houston, will equip its new plant now in course of construction, with modern machinery, and will give employment to 125 skilled mechanics.

The Multa Power Tractor Co., Fort Worth, has been incorporated with a capital stock of $10,000. R. W. Wynne is a stockholder.

The George W. Pittman Co., Waco, will build a plant for the manufacture of shovel handles.

St. Louis

ST. LOUIS, Sept. 17.

The Loeb Compress Co., Ruston, La., has been organized by Henry Loeb and others of Shreveport, La., and will equip a cotton compress at a cost of about $50,000.

The Williams & Miller Gin Co., Elk City, Okla., has been incorporated with a capital stock of $200,000 by Sam Williams, A. O. Miller and others and will equip a cotton ginnery and compress.

Scooba, Miss., is in the market for equipment for an electric light and power plant.

The Davis Mfg. Co., Enid, Okla., will equip a plant to manufacture threshing machines and separators, including a machine shop and foundry, at a cost of about $50,000. W. R. Lence is president and G. E. Richmond, engineer.

The Oil State Refining Co., Enid, Okla., capitalized at $250,000, will equip a pumping station with a daily capacity of 10,000 bbl. and a refinery with a capacity of 2500 bbl.

The Enid Oil & Pipe Line Co., H. H. Champlin in charge, will equip a pipe line and pumping stations, the contemplated investment being $200,000.

Wilson & Co., Little Rock, Ark., will equip a cold storage plant and are in the market for about $5,000 worth of machinery.

Meridian, Miss., J. M. Dabney, mayor, will expend about $150,000 in the equipment of a municipal ice plant.

The Fort Smith Metal Products Co., Fort Smith, Ark., has increased its capital by $50,000 and will enlarge its capacity to manufacture 1000 iron beds per day.

Galena, Mo., under the direction of the mayor, will expend about $100,000 in the equipment of a waterworks plant.

H. J. Wobus, Fullerton Building, St. Louis, is reported in the market for equipment for isolated plants, including oil engines of 30 hp. and generators of 25 kw. capacity.

California

LOS ANGELES, Sept. 11.

The Cochise Machine Co., Los Angeles, has awarded a contract for the erection of a one-story machine shop and blacksmith works, 100 x 105 ft., at Broadway and 115th Street, South Los Angeles.

The Pacific Platinum Works, 229 East Ninth Street, Los Angeles, has acquired property in the vicinity of its plant for the erection of a one-story factory, about 30 x 100 ft., plans for which have been prepared.

A four-story cold storage plant to cost about $54,000 will be erected by Wilson & Co., Los Angeles, on Lyon Street.

The Reliable Storage Battery Mfg. Co., Los Angeles, has been organized to operate a plant at 743 North Main Street. C. V. Graham, 1200 East Main Street, Alhambra, heads the company.

The D. & B. Pump & Supply Co., 2625 Humbolt Street, Los Angeles, will erect a one-story machine shop, about 50 x 160 ft., at 2616 Artesian Street.

The United States Hydrogen Generator Co., Los Angeles, has been incorporated with a capital of $25,000 to manufacture generator equipment. H. T. L. Hillman, W. S. Von Bergen and Frank Sparks are the incorporators.

The Los Angeles Shipbuilding & Dry Dock Co., San Pedro, Los Angeles, will erect a one-story addition, 50 x 150 ft., for blacksmith and forging work.

The Wilmington Shipbuilding Co., 621 Investment Building, Los Angeles, has leased property on the east basin in the Wilmington section for a new shipbuilding plant. It has received a Government contract for the construction of vessels to cost about $500,000.

A one-story brick and concrete power plant, about 80 x 98 ft., will be erected by the Board of Supervisors, Los Angeles, at 1126 Mission Road for county service, to cost about $38,500. William Davidson is chief engineer.

The Bleeker-Nelson Mfg. Co., Los Angeles, formerly operating a sheet metal working plant at San Diego, has removed its works to 1215-17 San Pedro Street, Los Angeles. It specializes in the production of sheet metal work for buildings, etc.

The Pacific Northwest

SEATTLE, WASH., Sept. 11.

To relieve the lumber shortage, which seems imminent, several wooden shipbuilders, it is reported, have leased lumber mills and others have deals pending to acquire sawmills and timber holdings. It is believed that unless a speedy adjustment of the lumber strike is effected, wooden shipbuilders will be forced to fabricate their own lumber to meet shipbuilding demands.

Machine shops and foundries throughout the Northwest are working 24 hr. per day to keep up with the enormous demand for their products. In many cases plants are booked with sufficient orders to keep them running for many months.

Allotment of contracts in New Westminster for the construction of auxiliary machinery for ships for the Imperial Munitions Board, B. C., is well under way, and machine shops in this city, Vancouver and Victoria are receiving their quota. Contracts totalling $60,000 have been awarded to shops in New Westminster. As rapidly as designers of the Imperial Munitions Board complete the designs for any unit of the work, they are submitted to the Metal Trades Association, tenders are called for, and contracts let, distribution being left in the hands of the association. No decision has been made in the matter of main engines for the vessels. It is considered possible that some complete sets may be built in Vancouver by the Wallace Shipyard, which plans a new shop for this purpose equipped with the necessary machinery.

Veitum & Clow, Eugene, Ore., have been notified that the Government has approved the valve grinding machine invented by the firm, and will order 36 for use in France.

The Pacific Sheet Metal Works, Victoria, has been reorganized under the name of the Pacific Sheet Metal Works, Ltd., with capital stock of $25,000.

The Olympic Steel Works, Seattle, has completed plans for a one-story addition, 73 x 102 ft., to cost $7,000.

The Modern Torch Co., formerly of Portland, Ore., is operating a plant at 413 Railroad Avenue, Seattle, for the production of oxy-acetylene cutting and welding torches.

The Reedsport Lumber Co., Gardiner, Ore., has been incorporated and will construct a sawmill at Reedsport with a daily capacity of 60,000 ft.

The Erickson Shipbuilding Co., Seattle, has purchased a 12-acre site on the Duwamish Waterway, on which will be erected a plant for the construction of steel ships for the Government. It is stated the company holds contracts for steel ships costing approximately $1,000,000 each.

The Foundation Co., Portland, has secured permits for the erection of 10 350-ft. shipways on the harbor between Nicolai and Sherlock Streets, at a cost of $24,000. It has also completed plans for the erection of a two-story saw shed and mold loft to cost $7,000.

The King & Winge Shipbuilding Co., Seattle, has been incorporated by Thomas J. King, president; B. Winge, vice-president, and C. B. Winge, secretary-treasurer. It will take over and enlarge the King & Winge shipyards in West Seattle.

The Los Angeles Shipbuilding & Drydock Co., which has just completed four ways for steel vessels at its yards on Smith's Island near Portland, is now working on plans for four additional ways for steel vessels.

The Pacific Steamship Co., San Francisco, has bought the old Price shipyard at Bandon, Ore., and will equip a plant for building wooden schooners.

A. J. Gyllenberg, Baker, Ore., will equip a one-story machine shop 50 x 100 ft., with machinery and tools for automobile and general iron and steel work.

The Markey Machinery Co., Seattle, will build an additional frame machine shop, 65 x 100 ft., one and one-half stories.

The Helser-Unden Machine Co., Portland, has completed plans for a one-story addition, 73 x 100 ft.

Canada

TORONTO, Sept. 17.

The Morrison Steel & Wire Co. will build a plant on Lulu Island, B. C., to cost $25,000.

W. A. Hunter, Ltd., Galt, Ont., has been incorporated with a capital stock of $40,000 by Frank Ellingham, Mary H. Hunter, and others, to manufacture automobiles, parts, accessories, etc.

The Canadian Coil Co., Ltd., Walkerville, Ont., has been incorporated with a capital stock of $40,000 by Carlos C. Cleverdon, Frank Nauta, Harry E. Westerdale, and others, all of Detroit, to manufacture spark and ignition coils, electrical goods, etc.

The Henderson Transfer & Lighterage Co., Ltd., Fort William, Ont., has been incorporated with a capital stock of $100,000 by Robert J. Henderson, John R. Smith, Frederick R. Morris, and others, to build ships.

Veneers & Panels, Ltd., Montreal, has been incorporated with a capital stock of $500,000 by Arnold Wainwright, Aubrey H. Elder, D. Burley-Smith, and others.

The Hamilton Lumber & Coal Co., Ltd., Hamilton, Ont., is in the market for a double drum hoisting engine.

The Goldie & McCulloch Co., Ltd., Galt, is in the market for a direct-current generator, 15 to 20 kw., 110 to 120 volts, from 600 to 700 r.p.m., and to include a rheostat.

A. E. Ponsford, St. Thomas, Ont., has been awarded contract for a plant at Tillsonburg, Ont., for the Maple Leaf Harvest Tool Co., at a cost of $50,000. It will consist of five buildings, 50 x 60 ft., 50 x 140 ft., 50 x 90 ft., 50 x 90 ft. and 100 x 130 ft., respectively, of concrete and steel, one story, and will be completed within three months.

The London Art Woodwork Co., London, Ont., is receiving bids for the erection of a factory and boiler house to cost $15,000. Watt & Blackwell, Bank of Toronto Building, are the architects.

William & J. G. Greey, Toronto, are in the market for a 20 or 25-hp. motor, 760 r.p.m., 25 cycle, 550 volts.

W. P. Near, city engineer, St. Catharines, Ont., will receive prices on motors, pumps, fittings, etc., for the Facer Street sewage system.

New Toronto, Ont., will purchase an electrical centrifugal pump.

The Brunner Mond Co., Amherstburg, Ont., will establish a power house at Canard River. It is erecting a plant at Amherstburg at a cost of $250,000.

Thomas McQueen, secretary of the Board of Control, City Hall, Toronto, will receive bids until Oct. 2 for stop valves, valve-operating pumps, etc., for the main pumping station.

New Foundries in New England

(*Continued from page* 651)

malleable foundry last year and is getting about a 25 per cent increase in output. Part of this is due to the installation of a number of molding machines. The gray iron foundry has been rearranged and a Paxson 42-in. cupola added, together with other equipment which will enable the company to double the output of this department. The core department has been increased to double its capacity to keep pace with the growth of the malleable and gray iron foundries.

The Worcester Foundry Co., Worcester, Mass., has a new plant, 52 x 198 ft., under construction and nearing completion. The main building will be 52 x 198 ft. and the company will conduct a general foundry business.

The Union Steel Casting Co., Boston, Mass., has experienced an increase of 300 per cent in the volume of business and to keep pace with this has added a second 2-ton converter and a 10-ton open-hearth furnace. The present total capacity of the plant is about 40 tons a day. Another 10-ton open-hearth furnace is ordered and as soon as it can be installed a further increase in production will be made. An increase in equipment and a considerable number of improvements will follow further expansion of the plant.